Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB

Conducted and published for the Club, by

MERRITT LYNDON FERNALD, Editor-in-Chief

CHARLES ALFRED WEATHERBY
LUDLOW GRISCOM
STUART KIMBALL HARRIS
} Associate Editors

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The New England Botanical Club, Inc.

8 and 10 West King St., Lancaster, Pa.

Room 1001, 53 State St., Boston, Mass.

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H pl. 585-587

Type of VIBURNUM DENTATUM

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Vol. 42. **January, 1940.** **No. 493.**

PLANTS OF SOUTHERN UNITED STATES[1]

H. K. SVENSON

I. VIBURNUM DENTATUM L.

(Plate 585)

THE perennial courtesy of Mr. Spencer Savage, who has provided me with the accompanying photograph of *Viburnum dentatum*, (PL. 585) made possible the examination of *Viburnum* in Linnaeus' herbarium at London in the summer of 1937. Through an examination of this TYPE, interpretation of the complex *V. dentatum* series, especially in the mountains of the southern United States, has been greatly simplified.

Linnaeus' diagnosis of *V. dentatum*[2] was exceedingly brief:

4. VIBURNUM foliis ovatis dentato-serratis ovatis.
Habitat in Virginia.

In the second edition (1762, p. 384) the last "ovatis" was changed to "plicatis."

A single sheet, bearing at the bottom the annotation "*dentatum*" in Linnaeus' hand and on the reverse side "Opulus ex America," shows at a glance that it does not represent *Viburnum dentatum* as recognized by botanists of the northeastern United States. The specimen has an inflorescence and four coarsely dentate leaves. The lower leaves are 8.5 cm. long and 10 cm. wide (*i. e.* wider than long), with petioles covered by setose yellow pubescence. The upper leaf-surface has long, usually appressed, scattered hairs, which are con-

[1] Brooklyn Botanic Garden Contributions, No. 89. Plates 585–587 supplied by that institution.

[2] Sp. Pl. 268 (1753).

spicuous on the veins toward the petioles. The lower leaf-surface is glabrous, except for tufts of stellate hairs in the axils of the veins. Inflorescence-branches are somewhat scabrous, as are also the petioles and veins of the lower surface of the leaf. Brown glands are conspicuous on the hypanthium. From general appearance and microscopic details it is obvious that true *Viburnum dentatum* (represented by the specimen under discussion) is the plant now passing as *V. pubescens* var. *Canbyi.*

The first adequate treatment of *V. dentatum,* after Linnaeus, was that of Solander,[1] who added the word "subcordatis" in his description of the leaves. He recognized three variations of *Viburnum dentatum* (see Blake, l. c.): the typical α *lucidum,* with glabrous leaves; β *pubescens,* with leaves villous below; and γ *sessile,* with short-petioled leaves villous below. These entities, worked out by Blake, are as follows:

α *lucidum* (based on a Bartram specimen received in 1764) "good *V. dentatum* L. as now taken by all authors";
β *pubescens* (Hort. Dr. Lee) "the plant now passing as *V. venosum* Britton";
γ *sessile* (from Bartram's collection from the Catskill Mts.) = *Viburnum affine* Bush.

Aiton did not publish var. *sessile,* and Pursh's *V. pubescens* therefore rested directly upon var. β. Of this Blake says (p. 12), "It is probable, furthermore, that the plant which Pursh really had in mind as *V. pubescens* was *V. venosum,* for the only specimens of the *V. dentatum* group collected by Pursh which I was able to find at the Kew Herbarium consisted of a branch of *V. venosum* on a sheet with two scraps of the somewhat pubescent form of *V. dentatum,* the whole labeled *Viburnum dentatum* in an old hand which Mr. Skan, the librarian at Kew, was not able to identify."

Specific differentiation in the *dentatum*-group has been based almost entirely on the presence and distribution of stellate hairs, but all sorts of combinations involving the presence or absence of stellate or simple hairs on inflorescence-branches, petioles or lower leaf-surfaces can be demonstrated. Even a cursory examination with a binocular microscope shows that most of the specimens of the northern phase of *V. dentatum* have some stellate hairs in the axils of the leaves and that

[1] See S. F. Blake, RHODORA xx. 11 (1918), for an excellent discussion of Solander's manuscript, which was the basis of Aiton's descripions (Hort. Kew., 1789) and consequently those of Pursh (1814).

the pubescence is by no means confined to the leaf-axils. Torrey & Gray[1] understood the situation when they remarked "The northern plant is very common, and uniform in appearance: the leaves are 2–3 inches long and often of nearly the same width . . . quite glabrous, except the tufts in the axils of the veins, and a few scattered hairs on the young petioles and veins beneath . . . But in Pennsylvania this same plant becomes more pubescent; a few scattered hairs often appearing on the upper surface of the leaves, while the young petioles and peduncles are clothed with separate or fasciculate hairs." How shallow the division into so-called species has been, can be seen from the key in Britton & Brown's Illustrated Flora, iii. 269 (1913):

Leaves glabrous, or with tufts of hairs in the axils beneath. . . . . . *V. dentatum.*
Leaves pubescent beneath, the pubescence more or less stellate.
  Veins of the leaves not very prominent. *V. scabrellum.*
  Veins very prominent on the under sides of the leaves. . . . . *V. venosum.*

The type of *V. venosum*[2] came from Nantucket Island, Massachusetts (coll. *E. P. Bicknell* in 1899), with "twigs and lower surfaces of the leaves very densely stellate-tomentose," and according to Bicknell (Bull. Torr. Bot. Club xlii. 348 (1915)) blooming somewhat later than "*V. dentatum.*" It is the only representative in the vicinity of Woods Hole on Cape Cod, where it appears to be distinct from *V. dentatum,* and has been so recognized by all recent botanists (cf. Fogg, Rhodora xxxii. 276 (1930)), but such a distinction is not tenable on the mainland to the westward.

V. venosum var. *Canbyi* Rehder[3] "Differs from the type by its thinner, less pubescent leaves, often only pubescent along the midrib beneath, especially those below the inflorescence much larger, often 5 to 8 cm. broad and the larger inflorescence like the young branchlets only slightly pubescent. This is apparently the form mentioned by Torrey & Gray in their Flora as intermediate between *V. dentatum* and *V. dentatum scabrellum.*" No type was designated by Rehder, but a number of collections by Canby were cited from Delaware and Pennsylvania.

Excellent specimens, collected by C. S. Schneider in the Arnold Arboretum (hb. Brooklyn Bot. Gard.) under the names *V. dentatum* (no. 613–2) and *V. venosum* var. *Canbyi,* have ovate fruits averaging

[1] Fl. N. Am. ii. 16 (1841).
[2] Britton, Man. 871 (1901).
[3] Rhodora vi. 60 (1904).

when dry 6 mm. long (stones 5.0 x 3.7 mm.) and globose fruits (stones 5.0 x 4.5 mm.), respectively. These stone-differences seem to parallel the differences in rotundity of the leaves. The stamen-characters, in this instance, are the opposite of those illustrated by Schneider, Handb. Laubh. ii, fig. 414 k, v (1912).

V. dentatum β *?scabrellum* Torrey & Gray,[1] described as having "young branchlets and peduncles scabrous and often hairy; leaves (often large) roundish-cordate or ovate, coarsely and rather obtusely toothed, pubescent beneath; petioles and peduncles shorter," was based directly on "V. dentatum (α & β chiefly), Michx.! fl. 1. p. 179; Ell. sk. i. p. 365," without further citation of specimens. The uncertainty was not decreased by their notation under *V. pubescens:* "Perhaps the plant which Pursh, and even Aiton, had in view, may have been our V. dentatum β. scabrellum," and it is evident from the specimens in the Torrey Herbarium that no clear differentiation was in mind. The basic synonymy reverts to Michaux's[2] descriptions of *Viburnum dentatum* vars. α *glabellum* and β *semitomentosum;* the former from the high mountains of Carolina, with suborbicular or short-ovate leaves; the latter smaller, with oval leaves tomentose below, from thickets in lower Carolina.[3] Michaux further stated that he had grown and compared living plants of both varieties and found no essential differences, but just what Michaux had in mind for var. *semitomentosum* can be determined only by an examination of the Michaux Herbarium. I am now treating var. *semitomentosum* as an extreme characteristic of the southern coastal plain, with small ovate scarcely cordate leaves pubescent below and only obscurely dentate, and with scabrellous branches. This is essentially *V. molle* var. ? *tomentosum* of Chapman's Flora, well represented in its extreme form by Curtiss' (2nd distr.) no. 5896 from River Junction, Florida. In this collection the leaves vary from ovate to cuneate, and are glandular below as well as sparsely stellate-pubescent, whereas the hypanthium is not glandular.

Typical *V. dentatum* is thus seen as characteristic of the Middle States and especially of the mountainous areas, passing locally into pubescent forms (var. *pubescens*). The northern part of the range, southward to Pennsylvania, is occupied almost exclusively by var.

[1] Fl. N. Am. ii. 16 (1841).

[2] Fl. Bor.-Am. i. 179 (1803).

[3] Elliott's treatment was a combination of Michaux and Pursh and offered nothing new.

lucidum. Var. *semitomentosum* appears to be equally characteristic of the southern coastal plain.

The variations of *V. dentatum,* as I see them, are essentially as follows:

Lower surface of leaf glabrous except for tufts in the axils of the veins (or sometimes with scattered hairs on the larger veins, or on the leaf surface).
  Hypanthium glandular; petioles and inflorescence-branches scabrous-pubescent; leaves orbicular to ovate, strongly plicate-veined . . . . *V. dentatum* (typical).
  Hypanthium glandless; petioles and inflorescence-branches glabrous or practically so; leaves thinner and usually narrower, less strongly veined . . . . var. *lucidum.*
Lower surface of the leaf pubescent.
  Leaves strongly cordate, orbicular to ovate . . . . var. *pubescens.*
  Leaves not cordate, ovate to cuneate (southern coastal plain) var. *semitomentosum.*

V. pubescens var. *Deamii* Rehder, Journ. Arnold Arb. v. 58, 59 (1924),[1] with stipules frequently present, branches glabrous, and leaves with the lower surface stellate-pubescent, should perhaps be separated. It seems to articulate with typical *V. dentatum* as represented on the Cumberland Plateau. The shallow crenate dentation of var. *Deamii* illustrated by Deam, Shrubs of Indiana, pl. 143 (1924), of which var. *indianense* Rehder, l. c., is held by Deam to be "only a form," can be readily duplicated in specimens from southeastern Masaschusetts (cf. Pepoon's collection from Woods Hole, July 5, 1897). *V. semitomentosum* (Michx.) Rehder, as treated by Small, Man. 1271 (1933) has its "counter-part" in *V. carolinianum* Ashe[2] of the Blue Ridge, with "large, coarsely-toothed leaf-blades." A fragmentary collection at the New York Botanical Garden from Union County, Georgia, has large, intensely hairy, almost velvety leaves. *V. Ashei* Bush, Am. Midland Nat. ix. 192 (1924), from southern Mississippi, described as having small cordate or subcordate leaves 4–6 cm. long, is evidently close to var. *semitomentosum.*

Essential bibliography of *V. dentatum* and its varieties is as follows:

V. DENTATUM L. Sp. Pl. 268 (1753); Jacquin, Hort. t. 36 (1770).[3] *V. venosum* Britton var. *Canbyi* Rehder in RHODORA vi. 60 (1904); Robinson & Fernald in Gray, Man. ed. 7, 760 (1908); Schneider, Handb. Laubh. ii. 647, fig. 415 h, i (1912). *V. pubescens* Pursh var. *Canbyi* Blake in RHODORA xx. 15 (1918).

[1] V. *Deamii* Bush, Am. Midland Nat. x. 239 (1927).

[2] Bull. Charleston Museum xiv. 31 (1918).

[3] Scarcely identifiable as to variety, but with much narrower leaves than in the Linnaean type.

Var. PUBESCENS Ait. Hort. Kew i. 372 (1789). *V. pubescens* Pursh, Fl. Am. Sept. i. 202 (1814); Blake in RHODORA xx. 15 (1918); Rehder, Man. Cult. Trees & Shrubs 808 (1927). *V. dentatum* var.? β *scabrellum* T. & G. Fl. N. Am. ii. 16 (1841) (partim). *V. venosum* Britton, Man. 871 (1901); Schneider (l. c.) fig. 414 u-y (1912); Britton & Brown, Ill. Fl. ed. 2, 272, fig. 3964 (1913).

Var. LUCIDUM Ait. Hort. Kew. i. 372 (1789). *V. dentatum* L. sensu Robinson & Fernald in Gray, Man. ed. 7, 760 (1908); Britton & Brown, Ill. Fl. ed. 2, fig. 3962 (1913) and all other recent authors.

Var. SEMITOMENTOSUM Michx. Fl. Bor.-Am. i. 179 (1803). *V. dentatum* var. β ? *scabrellum* T. & G. Fl. N. Am. ii. 16 (1841) (partim). *V. scabrellum* Chapman, Fl. Southern U. S. 172 (1860). *V. molle* var.? *tomentosum* Chapman, Fl. Southern U. S., ed. 3, 190 (1897). *V. semitomentosum* Rehder in RHODORA vi. 59 (1904).

II. SATUREJA GLABELLA (Michx.) Briquet

(Plate 586)

FROM rocky banks of the Cumberland River at Nashville, Michaux (1803) described *Cunila glabella,* an erect glabrous perennial with ovate-lanceolate leaves which were remotely serrate ["rarioribus dentibus serrata"]. This description obviously applied to leaves toward the middle of the stem, since the lowest leaves were stated to be oval, and the upper leaves gradually lanceolate ["superiora gradatim lanceolata"]. Vahl (1804) further described specimens which he received from Richard's herbarium as having an erect simple stem, hardly a foot high, the somewhat serrate leaves about 1½ inches long ["sesquipollicaria"] and the peduncles very short.

These descriptions quite evidently refer also to the large-flowered robust plant (our FIG. 1), apparently not stoloniferous, abounding in the cedar glades southeast of Nashville and accompanied by *Lobelia Gattingeri, Scutellaria parvula, Arenaria patula, Petalostemum Gattingeri,* and other plants typical of the limestone glades. The leaves in robust specimens are 2 to 3 cm. (rarely 3.5 cm.) long with a width up to 9 mm. However, procumbent small-flowered specimens with reduced leaves are occasionally encountered in the cedar glades, and these are in no wise different from the small linear-leaved plants growing northward, on river banks, to Niagara Falls (FIG. 2). All have identical seeds and the same conformation of the calyx lobes (cf. PL. 586). The extremes are now generally considered to be distinct species, though it is evident from current treatments that insufficient attention has been paid to the original description of Michaux.

Although some of this confusion may be attributed to Bentham, yet that distinguished writer more or less disclaimed knowledge as to the identity of *S. glabella* on p. 730 of the supplement (April, 1835) of his "Labiatarum": "Dr. Torrey writes to me that this [*Micromeria glabella*] is not Michaux's *Cunila glabella,* a plant with which I am in that case unaquainted." And Torrey (Fl. N. Y. ii. 68 (1843) cleared up the situation perfectly when he wrote: "The *Cunila glabella* of Michaux, which occurs on rocks in Tennessee, differs from the Niagara plant in being much larger; the leaves all ovate- or obovate-oblong, and toothed. I should have described the latter as a distinct species, had I not received some Ohio specimens, collected by Mr. Sullivant, which connect the two forms."

Part of the difficulty rests with Persoon, who (Syn. Pl. ii. 131 (1807)) changed Michaux's specific name [*Hedeoma*] to "*glabrum*" instead of "*glabella.*" This illegitimate name was in turn presumably copied by Nuttall (Genera i. 16 (1818)), though with a transformation of description, so that Nuttall's *Hedeoma glabra* applied primarily to the small form which had been found at Niagara Falls. Taxonomically, therefore, the names *Satureja glabella* (Michx.) Briquet and *S. glabra* (Nuttall) Fernald seem to be based on the same type, and *S. glabra* is therefore to be treated as a pure synonym. Bentham,[1] realizing somewhat vaguely that larger plants with leaves an inch or more in length ("pollicaria vel longiora") were to be separated from dwarf plants with leaves only one-half inch long, and knowing the difficulties with the name *Cunila glabra,* took up for the dwarf plants Torrey & Gray's manuscript name *Micromeria Nuttallii,* at the same time passing over the earlier valid name *Hedeoma arkansana* Nuttall.

The essential bibliography is as follows:

SATUREJA GLABELLA (Michx.) Briquet in Engler & Prantl, Pflanzenfam. iv^{3a}. 302 (1896). *Cunila glabella* Michx. Fl. Bor.-Am. i. 13 (1803); Vahl, Enum. Pl. i. 214 (1804). *Hedeoma glabrum* Persoon, Syn. ii. 131 (1807), nomen illegitimum; Pursh, Fl. N. Am. ii. 414 (1814) (as *H. glabra*); Nuttall, Genera i. 16 (1818) (excl. description, in large part). *Satureja glabra* (Nutt.) Fernald in RHODORA x. 85 (1908) (as to name-bringing synonym).—Apparently confined to limestone river bluffs and cedar glades in the vicinity of Nashville, Tennessee.

Var. **angustifolia** (Torr.), n. comb. *Micromeria glabella* Benth. var. *angustifolia* Torr. Fl. N. Y. ii. 67 (1843) (with synonymy). *Hedeoma arkansana* Nutt. in Trans. Am. Phil. Soc. n. s. v. 186 (1834). *Calamintha Nuttallii* Benth. in DC. Prodr. xii. 230 (1848). *Calamin-*

[1] DC., Prod. xii. 230 (1848).

tha glabella var. *Nuttallii* Gray, Man. ed. 2, 307 (1856). *Satureja arkansana* Briq. (l. c.). *Clinopodium glabrum* Ktze, Rev. Gen. 515 (1891); Britton & Brown, Ill. Fl. fig. 3655 (1913).

In PLATE 586, FIG. 1 is SATUREJA GLABELLA from Davidson County, Tennessee, *Svenson*, no. 8701 (B); FIG. 2, var. ANGUSTIFOLIA from Point Abino, Ontario, *M. O. Steele* in 1887 (B).

III. WOODY SPECIES OF HYPERICUM

(Plate 587)

KEY TO WOODY SPECIES OF EASTERN UNITED STATES:[1]

a. Capsules nearly spherical, 1-celled (i. e. not lobed, and their placentae therefore parietal); low or prostrate plants not exceeding 0.5 m. in height....b.
  b. Petals 10–12 mm. long; calyx-lobes 6–12 mm. long, often equalling the capsule..........................8. *H. dolabriforme*.
  b. Petals 5–8 mm. long; calyx-lobes 3–5 mm. long, much shorter than the capsule....................9. *H. sphaerocarpum*.
a. Capsules elongated, lobed, 3–5-celled by the intruding placentae; often tall woody bushes....c.
  c. Capsules 5-celled, with styles most frequently 5.
    Flowers 1–1.5 cm. broad, densely aggregated 3. *H. densiflorum* var. *lobocarpum*.
    Flowers 2–3 cm. broad, in a loose inflorescence....1. *H. Kalmianum*.
  c. Capsules 3-celled (often 4–5-celled in *H. densiflorum*)....d.
    d. Dwarf plants, diffusely spreading or decumbent....13. *H. Buckleyi*.
    d. Erect or often bushy-branched shrubs, usually 0.5 m. or more high....e.
      e. Plants of wet places with slightly woody base and prominent stolons.........................12. *H. adpressum*.
      e. Plants without prominent stolons....f.
        f. Flowers in a naked, regularly branched cyme.
          Leaves elliptic to ovate-lanceolate (1–2.5 cm. wide), thin, not revolute...............11. *H. nudiflorum*.
          Leaves linear, thickened, and usually with strongly revolute margins (2–6 mm. wide).10. *H. cistifolium*.
        f. Flowers in a more or less leafy inflorescence....g.
          g. Capsules with thick (ca. 0.5–1.0 mm.) ligneous walls; leaves broad and glaucous (1–2 cm. wide); strongly woody.
            Capsules 9–12 mm. long; flowers 2.5–4 cm. in diameter; plants of limestone rocks......5. *H. frondosum*.
            Capsules 12–13 mm. long, acuminate; plant of river banks on the coastal plain......7. *H. apocynifolium*.
          g. Capsules with thin walls.....h
            h. Leaves cordate-clasping, ovate to ovate-lanceolate.........................14. *H. myrtifolium*.
            h. Leaves more or less narrowed to the base....i.

[1] I have omitted from this discussion *H. Bissellii* Robinson, RHODORA iv. 136, pl. 37 (1902), a species which I do not sufficiently understand. For the loan of an extensive series of specimens I am much indebted to Dr. H. A. Gleason of the New York Botanical Garden. Citations (NY) and (B) following specimens refer to New York and Brooklyn respectively.

i. Leaves usually conspicuously verticillate and revolute, not exceeding 3 mm. in width, except in var. *pallidum;* inflorescence axillary to paniculate . . . . 4. *H. galioides.*
i. Leaves not conspicuously verticillate (occasionally so in *H. densiflorum*) . . . . j.
  j. Mature capsules 12–15 mm. long (exclusive of styles); leaves mostly 1–1.5 cm. broad, strongly glaucous below . . . . . . 6. *H. splendens.*
  j. Mature capsules not exceeding 1 cm. (exclusive of styles) . . . . k.
    k. Capsules 8–10 mm. long; flowers 1.5–2.5 cm. broad, few in narrow panicles; leaves averaging 1 cm. broad . . . . . 2. *H. prolificum.*
    k. Capsules 5–6 mm. long; flowers 1.0–1.5 cm. broad, numerous in corymbose panicles; leaves usually less than 1 cm. wide, frequently revolute . . . . 3. *H. densiflorum.*

1. H. Kalmianum L. Sp. Pl. 783 (1753); Coulter in Gray, Syn. Fl. N. Am. 285 (1897); Britton & Brown, Ill. Fl. ii. 530, fig. 2882 (1913). Known only from the region of the Great Lakes, although Coulter, Bot. Gaz. xi. 275 (1886), reported it, probably in error, from the oak barrens at Tullahoma, Tennessee.

The type in the Linnaean Herbarium is a fruiting specimen with 5-styled capsules 4–5 mm. long representing an average plant of *H. Kalmianum* as currently understood.

2. H. prolificum L. Mant. i. 106 (1767); Coulter in Gray, Syn. Fl. N. Am. 285 (1897); Robinson and Fernald in Gray, Man. ed. 7, 573 (1907). *H. prolificum*, chiefly var. β. T. & G. Fl. N. Am. i. 159 (1838).

The brief diagnosis given by Linnaeus, in his later years, is as follows [from Syst. Plant. ed. Reichard 593 (1780)]:

H. floribus trigynis: primordialibus sessilibus, caule ancipiti fruticoso, foliis lanceolato-linearibus.
H. floribus semitrigynis, staminibus corolla brevioribus, caule fruticoso sempervirente. *Gron. virg.* 112. . . .
Caules *recti, purpurascentes.* Folia *saepius revoluta, unde angusta Rosmarini.* Foliola *ramulorum primordia ex alis plurima.* Panicula *parva, terminalis.* Flores *primae secundaeque dichotomiae sessiles; reliqui terminales, pedunculati, numero rarius ultra* 7. Stamina *petalis non longiora.*

According to B. D. Jackson (Index to the Linnaean Herbarium), Proc. Linn. Soc. Suppl. 1911–1912, 26, 88 (1912), the presence of *H. prolificum* was first recorded by Linnaeus in 1767. There are at present five sheets in the Linnaean Herbarium, as follows:

No. 20. An unbranched fragment exhibiting only 3 flowers, arranged as in a candelabra, with the middle flower sessile. The linear, somewhat reflexed petals are 8 mm. long. The leaves in the verticel immediately

below the inflorescence are revolute, resembling those of *Ledum palustre*, but leaves 5 mm. wide occur in some of the lower verticels. At the base of the sheet is the annotation in Linnaeus' hand "proliferum" "frutice caule ancipite, foliis lineari lanceolatis, paniculo dichotimo, fl – –."

This sheet represents, I believe, a plant of *H. prolificum* in the accepted sense, but in which the leaves are unusually revolute. In this sense the specimen is aberrant, but the condition can be approached in any large series of specimens of *H. prolificum*. The origin of this specimen is unknown. It is evidently the sheet from which much of the diagnosis was drawn, but Linnaeus seems to have realized the underlying situation in describing the leaves as "lineari-lanceolatis."

No. 21. The upper portion of a plant with eight flowers in a nearly leafless cyme. The flowers are 1.5 cm. in diameter, with short obtuse spreading petals. The leaves are only slightly revolute, rather narrow, becoming 35 mm. long by 5 mm. wide. This specimen has also the notation "proliferum" in Linnaeus' hand, and in Smith's hand "foliosum ex ic. Jacq. n. 25, not L." On the reverse of the sheet "Hypericum idem cum Claytoni no. 552." This specimen is perhaps *H. densiflorum*, judging from the terminal inflorescence, the small flowers and narrow leaves.

No. 22. A specimen of *H. prolificum* as currently understood, with rather obtuse leaves as much as 50 x 11 mm., with the annotation "canadense?" in Linnaeus' hand.

No. 23. A specimen similar to the preceding.

No. 24. Another specimen of current *H. prolificum* with the annotation "Hypericum frutescens . . . vel fortasse spiraea salicifolio Clayt. n. 552."

Everything thus points to sheet no. 20 as the type, holding in mind that the upper leaves are probably aberrantly narrowed and revolute. The larger-leaved specimens of Gronovius, representing the current interpretation of *H. prolificum*,[1] may be included without changing the conception of the species.

3. H. DENSIFLORUM Pursh, Fl. Am. Sept. 376 (1814); Coulter in Gray, Syn. Fl. 285 (1897); Britton & Brown, Ill. Fl. 530, fig. 2884 (1913). *H. foliosum* Jacq. Hort. Schoenbrun. iii. t. 299 (1797), non Aiton (1789). *H. prolificum* sensu T. & G., Fl. N. Am. i. 159 (1838), non L. *H. prolificum* var. *densiflorum* A. Gray, Man. ed. 5, 84 (1867). *H. interior* Small, Bull. Torr. Bot. Cl. xxviii. 359 (1901); Fl. Se. U. S. 789 (1903). *H. glomeratum* Small, Bull. N. Y. Bot. Gard. i. 281 (1899); Man. 871 (1933).

Pursh's type from "dry ridges and savannahs of the Virginia mountains" is unknown, but the flowers were described as in "very

[1] The illustration by Britton & Brown, Ill. Fl. fig. 2883 (1913), probably *H. densiflorum*, does not greatly differ from the plant represented on sheet 21.

abundant and close panicles," the leaves as "lineari-lanceolatis obtusiusculis basi attenuatis." *H. densiflorum* remains the most confusing element among the woody species of *Hypericum*, since the limits are not clearly defined, especially in respect to *H. galioides*. It extends definitely to Arkansas and southeastern Missouri.

H. interior was based on a *Rugel* collection (at least as to TYPE) from Dandridge, Tennessee, but a collection by *Veatch* (without locality) was cited from Texas. It is without question merely *H. densiflorum*, which seems to abound in the Tennessee Valley. *H. glomeratum* was separated from *H. prolificum* "by the small size of all its organs, especially the smaller corollas, and by the terminal inflorescence" and from *H. densiflorum* by the larger corollas and by the congested inflorescence. The capsules of the TYPE of *H. glomeratum* (herb. N. Y. Bot. Gard.) collected near the base (!) of Grandfather Mt., North Carolina (*A. M. Huger*, Aug. 1896), are just 5 mm. long, and they do not differ in any respect from those of *H. densiflorum*. The only material with good flowers labeled *H. glomeratum* by Dr. Small is a collection (*A. A. Heller* no. 21, Aug. 2, 1890) from the summit of Table Rock Mt., North Carolina, and I suspect that this sheet is the source of petal measurements "fully 1 cm. long" in the original description. The *Heller* specimen is good *H. prolificum*, approaching as closely as anything that I have seen to the typical Linnaean specimen. *H. glomeratum* thus seems to have been founded on an ill-assorted mixture of *H. densiflorum* and *H. prolificum*. *H. densiflorum* passes directly into

Var. **lobocarpum** (Gattinger) n. comb. *H. lobocarpum* Gattinger ex Coulter, Bot. Gaz. xi. 275 (1886); Fl. Tenn. 120 (1901); Small, Man. 874 (1933). *H. oklahomense* Palmer, Journ. Arnold Arb. v. 128 (1924).[1]

Gattinger (1901) described the leaves as "linear, obtuse, slightly mucronate, attenuate downward, pale underneath," and Coulter (p. 276) noted that the "broad leaves are exactly those of H. prolificum." Gattinger's specimens from Hollow Rock, West Tennessee, and Hasse's collections from Little Rock, Arkansas, vary in leaf width from 4 mm. to 14 mm., with the average well under 1 cm.; but on the other hand, leaves 1 cm. wide are occasional in *H. densiflorum* from New Jersey. Coulter (l. c.) discusses the precarious limits of *H.*

[1] It is probable that *H. rostratum* Raf. Fl. Ludov. 88 (1817); Eaton, Man. ed. 6, 185 (1833), described as having five styles and a five-angular ovary, is the same as *H. lobocarpum*.

lobocarpum as a species, of which *H. oklahomense* appears to be merely a narrow-leaved form resembling *H. densiflorum.* It is well known that *H. densiflorum* grows both in swamps and on dry slopes, so that habitat is here no indicator of specific differences. Although in some material from the west the capsules are almost invariably 5-lobed, the following comparison is enlightening:

	Capsules 3-lobed	Capsules 4-lobed	Capsules 5-lobed
H. densiflorum, at Brooklyn Botanic Garden, transplanted from the New Jersey pine barrens. (100 capsules)	49	47	4
H. lobocarpum, Biltmore Herb. no. 3989 from Hollow Rock, Tennessee. (25 capsules)	1	16	8

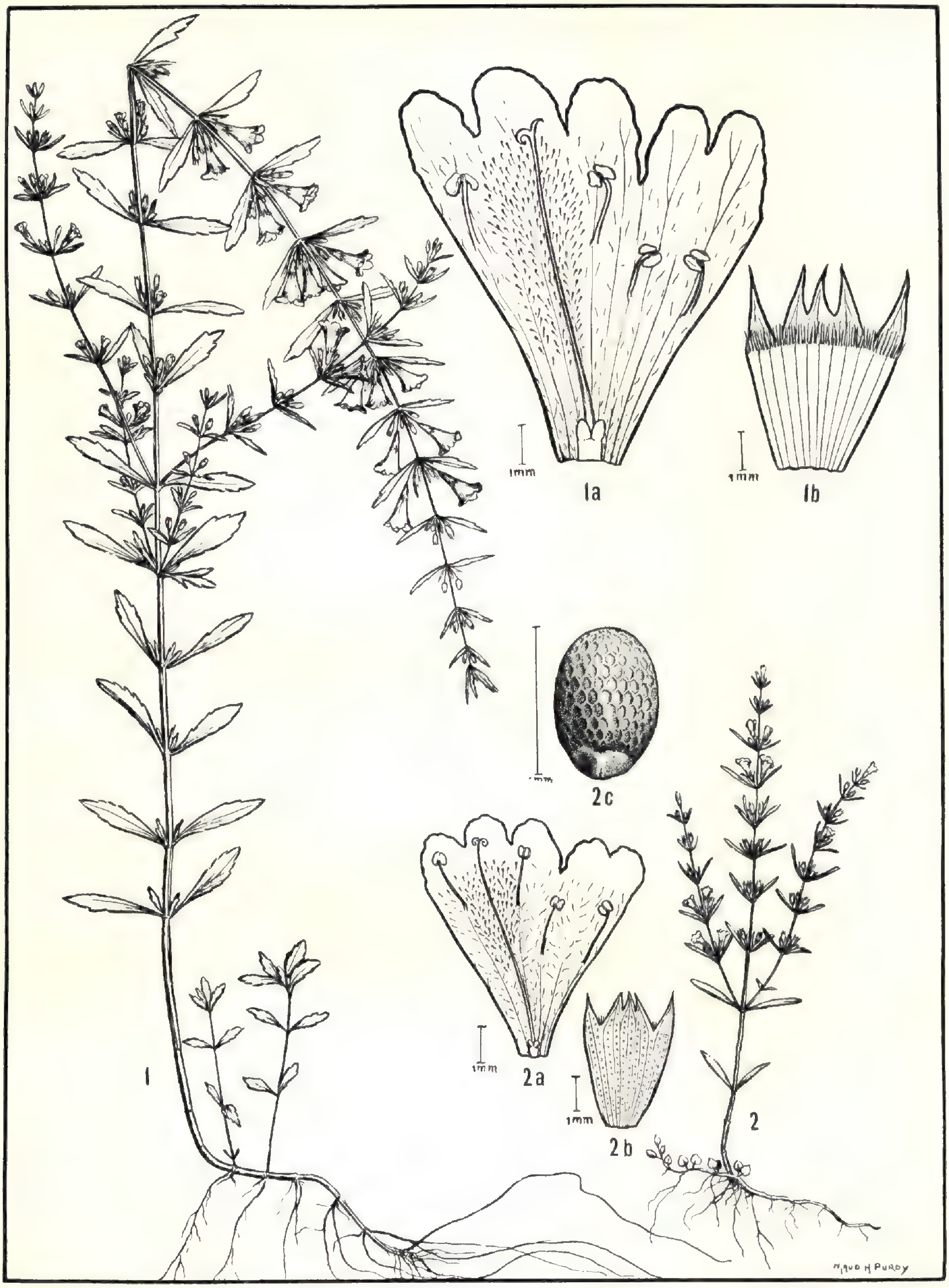
4. H. GALIOIDES Lam. Encyc. iv. 161 (1797) [PL. 587]. *H. nitidum* Lam. (l. c.) 160 (1797). *H. fasciculatum* Michx. Fl. Bor.-Am. 80 (1803); Willd. Sp. Pl. iii. 1452 (1803); non Lam. *H. Michauxii* Poir. Suppl. iii. 694, 696 (1813).

var. **fasciculatum** (Lam.) n. comb. (PL. 587, FIG. 2). *H. fasciculatum* Lam. Encyc. iv. 160 (1797). !*H. Coris* Walt. Fl. Carol. 190 (1788), non L. !*H. aspalathoides* Willd. Sp. Pl. iii. 1451 (1803).

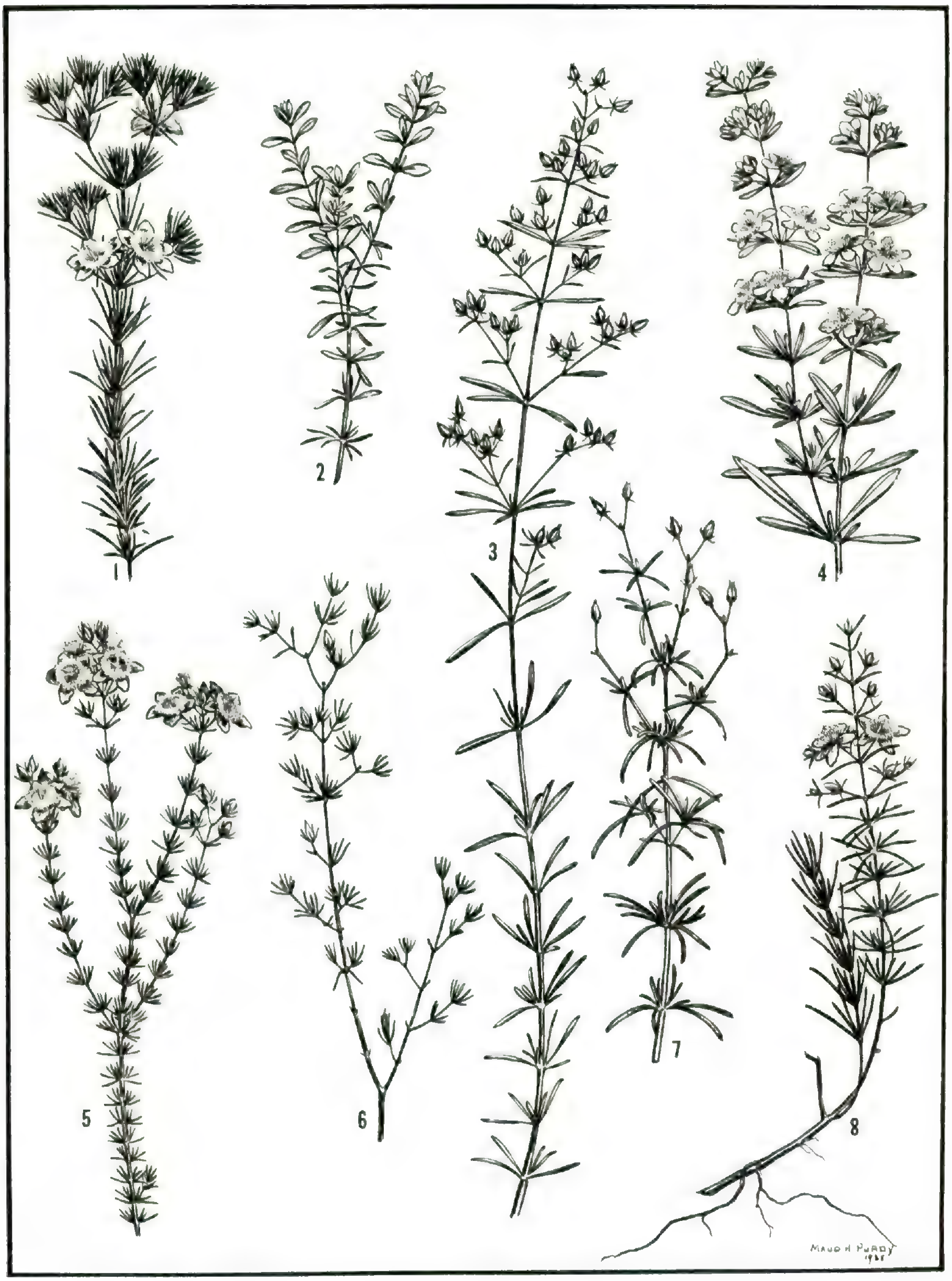
H. fasciculatum (see PL. 587, FIG. 1) often has the axillary leaves strongly developed, so much so that the leaves scarcely appear to be verticillate, and has exceptionally dense clusters of terminal leaves. "Ces feuilles semblent disposées par faisceaux épais, apparence qui est due á de jeunes rameaux axillaires qui ne prennent que peu de développement" (Lamarck, l. c.). The Lamarck specimen at Paris is the same as Willdenow's specimen of *H. aspalathoides*[1] (coll. *Kinn*) which bears an old label "*H. rosmarinifolium.*" Gray (T. & G. Fl. i. 672 (1840)) took this specimen as the type of *H. fasciculatum* var. *aspalathoides* and erroneously referred it to the var. β (op. cit. 160 (1838)) which obviously was intended for the most reduced form of the species, with leaves "2–3 lines [4–6 mm.] long," the var. *aspalathoides* of current usage. Lamarck's specimen has very narrow leaves 1–1.5 cm. long; in the Willdenow specimen they are about 12 mm. long, a little less revolute than in the Lamarck specimen and therefore sometimes nearly 3 mm. broad.

[1] Both the name and description of *H. aspalathoides* were accompanied by the letter "W" which Willdenow (op. cit. p. viii) explains as follows: "Nova mihi visa vegetabilia proprii Herbarii, littera W nomina triviali subsequente insignavi, et in descriptionibus a me factis eadem littera post has usus sum, more *Reichardi*, cujus R. quum quaedam adjecerat etiam adposui." New plants [i. e. species] seen by me in my own herbarium have the letter W signed after the trivial name, and after descriptions by me I have used the same letter in the manner of Reichard. . . .

Willdenow had both a description and a specimen. Since the specimen is typical *H. fasciculatum*, tne name is untenable, and the legality of Willdenow's procedure becomes inconsequential.



SATUREJA GLABELLA: FIG. 1, plant, × ½; FIG. 1a, corolla, enlarged; FIG. 1b, calyx, enlarged.
Var. ANGUSTIFOLIA: FIG. 2, plant, × ½; FIG. 2a, corolla, 2b, exterior of calyx and 3c, seed, all enlarged.



HYPERICUM GALIOIDES ($\times \frac{1}{2}$): FIG. 1, var. FASCICULATUM; FIG. 2, heterophyllous form (Florida); FIG. 3, var. TYPICUM; FIG. 4, var. PALLIDUM; FIG. 5, var. REDUCTUM; FIG. 6, aff. var. CUBENSE; FIG. 7, intermediate form (close to H. NITIDUM); FIG. 8, var. LLOYDII.

It is evident that the greatest confusion exists in the minds of modern authors as to what the names *H. fasciculatum* and *H. galioides* represent, and it is equally obvious that the plants form an inseparable intergrading series, a conclusion which Treviranus long ago reached.[1] Because of this confusion I have cited very few recent authors. *H. galioides* seems to be closer than *H. fasciculatum* to the biological center of the species. The type of *H. galioides* at Paris, a collection from "carol. merid." by Fraser, has verticillate leaves, narrowly-linear but only slightly revolute, and dark brown capsules 3.5 mm. long, in loose cymose clusters. It is apparently identical with several collections from the vicinity of Wilmington, North Carolina, and is not so closely matched elsewhere. "Il a les feuilles presqu'aussi étroites que celles de l'*hypericum fasciculatum*, & souvent fasciculées d'une manière analogue, mais à faisceaux moins denses, qui les font plutôt paroître comme verticellées." A specimen closely resembling the type is illustrated (PL. 587, FIG. 3). *H. fasciculatum* Michx. [specimen examined in herb. Paris] has verticillate leaves and is identical with taller shrubby material, such as I have collected in southwestern Georgia.[2] Though I have not seen a specimen of *H. nitidum* Lam. it is obviously close to *H. fasciculatum* Michx. judging from the description "extrêment voisin de l'*hypericum fasciculatum:* cependant ses feuilles plus longues & plus luisantes, moins roides [stiff]" . . . The leaves were further described as very narrow,[3] pointed, opaque, and shiny as though varnished, some of them straight, but for the most part curved in an arc. Both *H. fasciculatum* Michx. and *H. nitidum* Lam. belong, without any question, in the heterogeneous

[1] Treviranus, L. C. In Hyperici genus. p. 15, Bonn. 1861.

"*Hyp. fasciculatum Lam.* Quae a *Lamarkio* in *Encycl.* IV sub *nris.* 37–41. propositae descriptaeque sunt plantae, scilicet *Hyp. rosmarinifolium, fasciculatum, nitidum, axillare, galioides* unius eiusdemque speciei videntur formae, ut mittamus recentiores quorundam sententias ac denominationes. Omnibus enim idem est locus natalis, omnium truncus suffruticosus teres rimosus, ramulis subangulatis subpatentibus, folia lanceolato-linearia, infra medium attenuata, obtusa margine reflexa, supra punctato-scabra, subtus glabra, patentia, axillis soboliferis. Calycis segmenta ("foliiformia" Mich.) linearia, petalis parum breviora obovatis cum acumine laterali. Antherae absque nota. Styli ad apicem usque coadunati. [These appear to be forms of one and the same species, as recent opinions and determinations attest. All are native to the same locality, the trunk in all is semi-shrubby, terete and fissured, the branches subangulate and somewhat spreading, the leaves lanceolate-linear, attenuate below the middle, obtuse with a reflexed margin, punctate-scabrous above, glabrous below, spreading, with axillary tufts.]

[2] Dr. R. M. Harper has recently sent me a picture of shrubs (probably of this form) from adjacent Florida, which are 12 feet (nearly 4 m.) high and 4 inches in diameter at the base.

[3] "à peine le tiers d'une ligne" [scarcely 0.7 mm. wide].

assemblage of plants lying between typical *H. galioides* and var. *fasciculatum*.

Var. **reductum** nom. nov. (PL. 587, FIG. 5). *H. fasciculatum* var. β. T. & G. Fl. N. Am. i. 160 (1838). *H. fasciculatum* var. *aspalathoides* T. & G. (l. c., p. 672) but not as to type in herb. Willd. *H. tenuifolium* Pursh, Fl. Am. Sept. ii. 377 (1814), fide T. & G. (l. c.). *H. fasciculatum* Lam. sensu Lott in Journ. Arnold Arb. xix. 279 (1938). This extreme, with verticillate leaves often as short as "2–3 lines" [4–6 mm.], appears to be common in the southern part of the coastal plain.

A small procumbent variant of *H. galioides* [cf. pl. 587, fig. 8] with long verticillate and revolute leaves from the piedmont (vicinity of Augusta, Georgia, and Aiken, South Carolina) may perhaps be worthy of distinction.

Var. PALLIDUM Mohr in Contrib. U. S. Nat. Herb. vi. 621 (1901); Lott in Journ. Arnold Arb. xix. 149 (1938). *H. galioides* Lam. var. *ambiguum* (Elliott?) Chapman, Fl. S. United States 40 (1860).

Elliott's description was inconclusive and refers as well to *H. densiflorum* as to a variation of *H. galioides*. Torrey & Gray (p. 673) saw the Elliott specimen and thought that it resembled "our H. rosmarinifolium." According to Mohr's description the leaves are ¼ inch [6 mm.] wide. Occasional specimens are encountered in the herbarium with leaves 7 or even 8 mm. wide. The leaves are thin, flat (not revolute), with numerous veins set at right angles to the midvein and branching in a dendritic fashion. The illustration (PL. 587, FIG. 4) is from a collection, distributed by Curtiss (no. 6483), from Florida. This variety is mentioned by Chapman as coming from "river swamps, Florida."

Grisebach, Cat. Pl. Cubens. 39 (1866) described *H. galioides* vars. *cubense*[1] and *axillare* from Cuba. Specimens from Cuba which I have seen have much the appearance of material from southern Florida, which I have figured (PL. 587, FIG. 6), but I cannot state with certainty just what the relationships are. The var. *axillare* was based upon *H. axillare* Lam. Encyc. iv. 161 (1797), referred by Gray (T. & G., p. 672) definitely to *H. galioides*. It is probably close to var. *pallidum* Mohr,

[1] "(Wr.[ight] 2126: recedit . . . foliis angustioribus lineari-filiformibus margine revolutis, sepalis angustis saepe inaequalibus); var. *axillare* Lam. sec. Trevir. (Wr. 2123: forma foliis brevioribus 4‴ [8 mm.] fere longis dense fasciculatis, floribus subsolitariis; frutex gracilis . . . ; eandem formam vidi in coll. Beyrichiana e Georgia sub nomine *H. fasciculati* Lam., etiam a b. Trevirano cum H. galioidi conjuncti)." Though var. *axillare* was based upon *H. axillare* Lam., Grisebach's description applies to a wholly different plant. [Treviranus made no new combinations under *H. galioides*.]

as to type, though verging toward tyical *H. galioides.* The flowers of *H. axillare* as described by Lamarck are fairly large, about 6 lines [about 13 mm.] in diameter, and situated in the axils of linear-lanceolate leaves about 15–20 mm. long and 5 mm. or less wide. These leaves were described as somewhat revolute on the margins and veinless below except for the midrib. There is some possibility that *H. axillare* may represent a narrow-leaved *H. densiflorum,* into which *H. galioides* seems at times to merge.

Some of these variations of *H. galioides* are of doubtful geographic significance and are probably not the equivalent of subspecies of zoological usage. The types upon which they are based represent fortuitous selections from a continuous linear series and serve principally as the loci around which specimens can be grouped.

5. H. FRONDOSUM Michx. Fl. Bor.-Am. ii. 81 (1803); Poir. Suppl. iii. 699 (1813); Lott in Journ. Arnold Arb. xix. 149 (1938). *H. aureum* Bartram, Travels 383 (1791), non Loureiro (1790).

The type, from rocks along the Tennessee River, has flowers 3 cm. in diameter; the largest leaves are 52 x 13 mm., somewhat glaucous below. This species apparently reaches its best development in the cedar glades near Nashville, Tennessee, where it frequently forms rounded bushes as much as a meter high. Otherwise the species is encountered in the form of sprawling shrubs adhering to limestone rocks of river bluffs in Tennessee and Alabama.

6. H. SPLENDENS Small, Bull. Torr. Bot. Cl. xxviii. 291 (1901); Man. 872 (1933).

This shrub, 0.5–1.5 meters tall, known only from Stone Mt., Georgia, is exceedingly close to *H. frondosum,* from which it may be distinguished by the "smaller firmer leaves, the more distinctly pedicelled flowers and the conic buds," as well as by the acuminate capsules which have comparatively thin walls. The type is represented by two sheets collected by Dr. Small showing material both in flower and in fruit.

7. H. APOCYNIFOLIUM Small, Bull. Torr. Bot. Cl. xxv. 616 (1898); Man. 871 (1933).

I suspect that the type of this species is the specimen (NY) collected by A. A. Heller in Texarkana, Texas, in August 1897, although Leavenworth's rather fragmentary specimens from Arkansas are also mentioned. Leavenworth's plants, evidently the type of *H. nudi-*

florum var. β T. & G., Fl. N. Am. i. 163 (1838), I believe represent *H. lobocarpum* Gattinger.

H. apocynifolium, closely related to *H. aureum*, is characterized by acute heavy-walled capsules and large, thin, glaucous leaves. It is a bush of river banks of the coastal plain, represented by only a few collections, as follows: GEORGIA: Chattahoochee River above Georgetown, Quitman Co., *R. M. Harper* no. 1755 (NY) [seeds of the *prolificum* type, 1.7 mm. long]; St. Mary's River at Trader's Hill, Charlton Co., *R. M. Harper* no. 1501½ (NY). ALABAMA: shrub 2 ft., much branched, river bank, Tallapoosa Co., *F. S. Earle* no. 2141. TEXAS: Texarkana, *A. A. Heller* in Aug. 1897 (TYPE).

8. H. DOLABRIFORME Vent. Hort. Cels 45, t. 45 (1800); Coulter in Gray, Syn. Fl. 287 (1897); Britton & Brown, Ill. Fl. ii. 532, fig. 2889 [copy of Ventenat's plate] (1913). *H. procumbens* Desf. ex Willd. Sp. Pl. iii. 1450 (1803); Torrey & Gray, Fl. N. Am. i. 162 (1838); Coulter in Gray, Syn. Fl. 287 (1897).

H. dolabriforme was described by Ventenat (type not seen by me) from a specimen collected by Michaux "sur les collines très-arides du Kentucky," and illustrated by a plant which flowered in the greenhouse. The flowers are described as 3 cm. in diameter and correspond to those in Rédouté's plate (t. 45), therefore to be taken as illustrating the plant in natural size. The leaves thus have a maximum size of 4 cm. in length and 4 mm. width. The petals are 1.5 cm. long. The specimen which I have seen, most nearly conforming to these dimensions, is *Ruth* no. 2432 from Knoxville, which has the dried flowers 2.5 cm. in diameter.

H. dolabriforme seems to be confined to a limited area: KENTUCKY: Stony banks, Warren Co., *Eggert* in 1897; Monticello, Wayne Co., *Smith & Hodgdon* no. 4013; Bowling Green, *Eggert* in 1897; *Short*, sine loc. TENNESSEE: Knoxville, *Ruth* nos. 382, 2432, 6304, and collected also by Lamson-Scribner and Kearney; flat limestone rocks along road n. of Pikeville, Sequatchie Co., *Svenson* no. 8700 (B). GEORGIA: on flat exposed limestone rocks, eastern base of Pigeon Mountain, *R. M. Harper* no. 359 (NY).

The type of *H. procumbens* at Berlin (Willd. no. 14424) and fragments at Paris have revolute leaves 2–3 mm. wide and petals 8 mm. long, prominently mucronate at the apex. The type is close in appearance to a collection by Eggert from Bowling Green, Kentucky (Aug. 3, 1897) (NY). Accompanying the specimen at Berlin is an old label reading "petala quasi falcata. Descrit par Ventenat a ce qui je crois sous le nom d'obliquum sive falcatum. Amer. Sept." This specimen also has petals only 8 mm. long, narrow revolute leaves, and

the sepals of *H. dolabriforme.* Without doubt it belongs to that species, as Asa Gray long ago noted.

9. H. SPHAEROCARPUM Michx. Fl. Bor.-Am. ii. 78 (1803); T. & G., Fl. N. Am. i. 163 (1838). *H. nudiflorum* sensu Reichenbach, Icon. Bot. Exot. 60, t. 87 (1827), non Michx. *H. cistifolium* sensu Coulter in Gray, Syn. Fl. i. 287 (1897), non Lam.; Robinson & Fernald in Gray, Man. ed. 7, 574 (1908); Britton & Brown, Ill. Fl. ii. 532, fig. 2888 (1913); Small, Man. 871 (1933).

Michaux described the species as follows: "H. herbaceum, glaberrimum, erectum: foliis oblongis: panicula nuda, dichotoma; dichotomis omnibus 1-floris: stylo unico, demum tripartibili: capsula globosa. *Hab.* in Kentucky."

The type, examined by me at Paris, has the notation "Route de Louisville." It is more slender than most herbarium specimens which I have seen, with leaves not exceeding 8 mm. in width, and might conceivably be taken for an example of *H. denticulatum,* which occurs here and there in Kentucky, except for the united styles and rotund capsules. Some confusion has occurred with *H. nudiflorum,* which has broader shiny leaves, slender capsules, and reflexed calyx lobes. The rugose seeds of *H. sphaerocarpum* are twice as thick as those of *H. densiflorum.* From Kentucky the typical form of the species (with flat prominently-veined leaves 5–15 mm. wide and of strict growth) extends into the prairies of Illinois, Kansas, and Missouri. In the cedar glades near Nashville, *H. sphaerocarpum* abounds as a low bushy-branched ligneous plant with narrow, veinless, somewhat revolute leaves 2–7 mm. wide, and with sepals more or less glutinous. A similar form extends southward into the chalk barrens of southwestern Alabama. The seeds are identical with those of typical *H. sphaerocarpum.* This bushy-branched, narrow-leaved plant has a well-defined geographical distribution and should be treated as

H. sphaerocarpum var. **turgidum**, n. comb. (*H. turgidum* Small, Fl. Se. U. S. 788 (1903) and Man. 871 (1933).

The TYPE from Huntsville, Alabama, *Canby* no. 14 (NY) (Oct. 7, 1897) has leaves 4 mm. wide. By Harper[1] it is considered as similar to *H. sphaerocarpum* and "perhaps not specifically distinct."

10. H. CISTIFOLIUM Lam. Encyc. iv. 158 (1797); Watson, Bibl. Index 125 (1878), exclud. syn. *H. nudiflorum*. *H. rosmarinifolium* Lam. Encyc. iv. 159 (1797). *H. opacum* T. & G., Fl. N. Am. i. 163 (1838); Coulter in Gray, Syn. Fl. i. 287 (1897); Small, Man. 871 (1933).

[1] Trees, Shrubs, and Vines of Alabama, Geol. Surv. Ala. Mon. 9^2. 273 (1928).

Lamarck's description of the leaves as lanceolate-oblong, opposite, sessile, amplexicaule and somewhat revolute, punctate below, and the fact that the young capsule is "ovale" definitely place *H. cistifolium* as *H. opacum;* indeed, Asa Gray after examining the type of *H. cistifolium* unequivocally (T. & G. op. cit., 673) placed *H. opacum* as a synonym of that species, and further noted "Possibly this is the original H. rosmarinifolium also." The fragmentary specimen of *H. rosmarinifolium* at Paris can represent nothing but much-reduced side-branches of *H. opacum*, accompanied by a single very mature trilocular capsule which is 8 mm. long, including the attenuate apices of the spreading carpels. The revolute-margined leaves are opposite, somewhat amplexicaule, 1–1.5 cm. long and 2 mm. wide, prominently spotted below. Coulter,[1] probably overlooking Gray's identification, maintained that *H. sphaerocarpum* Michx. and *H. cistifolium* Lam. were the same species, thereby changing his previous opinion[2] that *H. nudiflorum* Michx. and *H. cistifolium* Lam. were synonymous. These misinterpretations, I believe, have their foundation in Reichenbach's illustration of *H. nudiflorum* (Icon. Bot. Exot. t. 87), which is actually *H. sphaerocarpum*, though Watson with question included Reichenbach's plate under *H. cistifolium*, a species apparently confined to the coastal plain.

11. H. NUDIFLORUM Michx. Fl. Bor.-Am. ii. 78 (1803); Torrey & Gray, Fl. N. Am. i. 162 (1838); Gray, Man. 53 (1848); Small, Man. 871 (1933).

The identity of this species has often been badly confused [see discussion under *H. cistifolium*]. Michaux's TYPE, which was collected in "Carolina," consists of two sheets bearing the notation "Goose Creek & Ga [net ?] place." The prominent dichotomous inflorescence (just past flowering) stands above broadly lanceolate leaves, which are 4 cm. long, impress-veined on the upper surface, and strongly dark-spotted below. It is much like the material recently collected by Fernald & Long (no. 4039) in eastern Virginia. When well-developed, as I have seen it on sandstone bluffs of the Cumberland Plateau of Tennessee, it is a handsome shrub with pale yellow flowers, growing to the height of 1 meter.

12. H. ADPRESSUM Barton, Comp. Fl. Phil. ii. 15 (1818); T. & G., Fl. N. Am. i. 159 (1838); Robinson, RHODORA iv. 136, pl. 37 (1902) (including var. *spongiosum* (l. c.)); Britton & Brown, Ill. Fl. 531, fig. 2887 (1913). *H. fastigiatum* Ell. Sketch. Bot. S. Car. & Ga. ii. 31

[1] in Gray, Syn. Fl. i. 287 (1897).

[2] Bot. Gaz. xi. 86 (1886).

(1821), not HBK., Nov. Sp. & Gen. v. 195 (?1821). *H. adpressum* var. *fastigiatum* T. & G., Fl. N. Am. i. 673 (1840).

It is a question whether var. *fastigiatum* (Ell.) T. & G. Fl. N. Am. i. 673 (1840) is worth keeping. Torrey & Gray (l. c.) describe it as "a form of H. adpressum, with longer and more acute leaves, and a larger and more fastigiate cyme than usual." Specimens collected by me in Middle Tennessee have leaves as much as 5.5 cm. long and 8 mm. wide, with swollen bases just as in var. *spongiosum* Rob. The spongy condition, undoubtedly a response to submergence, is characteristic also of *Lycopus rubellus,* which accompanies the *Hypericum* in Tennessee. On Long Island, spongy plants have their bases in water; when *H. adpressum* is transplanted into drier situations the spongy character of the stems tends to disappear. Furthermore, it is questionable whether the name *fastigiatum* is available for use here. *H. fastigiatum* HBK., a Mexican species, dates from 1821,[1] and *H. fastigiatum* Ell. from late in 1821.[2]

13. H. Buckleyi M. A. Curtis, Am. Journ. Sci. xliv. 80 (1843); Coulter in Gray, Syn. Fl. i. 285 (1897); Schneider, Ill. Handb. Laubh. ii. 333, fig. 222a (1912); Small, Man. 873 (1933).

This little species with the aspect of *Vaccinium caespitosum* appears to be confined to openings on mountain tops from North Carolina to Georgia at an altitude of about 5000 feet.

14. H. myrtifolium Lam. Dict. iv. 180 (1797); Coulter in Gray, Syn. Fl. i. 286 (1897); Small, Man. 872 (1933). *H. glaucum* Michx. Fl. Bor.-Am. ii. 78 (1803).

Easily recognized by the clasping leaves, which are frequently glaucous. *H. myrtifolium* is confined to the coastal plain.

Brooklyn Botanic Garden,
Brooklyn, New York

Explanation of Plate 587

Hypericum galioides Lam. (× ½): fig. 1, var. fasciculatum, from Lake Worth, Dade County, Florida, *Lathrop* in 1894 (B); fig. 2, heterophyllous form from Dade County, Florida, *Small & Mosier* no. 5641 (NY); fig. 3, var. typicum (close to Lamarck's type), from Arlington, North Carolina, *Canby* in October, 1867 (NY); fig. 4, var. pallidum from sandy bank of creek, Ponce de Leon, west Florida, *Curtiss* no. 6483 (2nd. distrib.) (NY); fig. 5, var. reductum from sandy barrens, Mosquito Lagoon [Brevard County], Florida, *Curtiss* no. 258* (NY); fig. 6, aff. var. cubense from hammock in Everglade Keys, Monroe County, Florida, *Small, Carter & Small* no. 3476 (NY); fig. 7, form probably close to H. nitidum Lam., from Whitfield County, Georgia, *R. M. Harper* no. 2032 (NY); fig. 8, a procumbent variant from Graniteville, Aiken County, South Carolina, *Eggert* in 1898 (NY).

[1] Barnhart, Bull. Torr. Bot. Cl. xxix. 597 (1902), cites the probable date of issue as February, 1822, but this date is not certain.

[2] Cf. Barnhart, Bull. Torr. Bot. Cl. xxviii. 688 (1901).

RANGE EXTENSIONS OF MARSH AND AQUATIC PLANTS

Neil Hotchkiss

During the past ten years of field study of waterfowl ecology, excellent opportunity has been afforded several members of the Bureau of Biological Survey, United States Department of Agriculture, to visit localities not readily accessible to most botanists and to make detailed observations on marsh and aquatic vegetation. The following records seem worthy of note.

Specimens of each collection have been filed in the United States National Herbarium and duplicates of a few in the Gray Herbarium. Identifications are by the writer, except as otherwise noted.

Potamogeton praelongus Wulfen. Almaloya del Rio, Rio Lerma, Estado de México, Mexico, April 17, 1935, *E. A.* and *L. J. Goldman.*

This is apparently the first record from south of the United States; but the high altitude of the Mexican Plateau makes its occurrence there a natural one.

Halodule Wrightii Aschers. New River, Marines, Onslow County, North Carolina, October 11, 1935, *N. Hotchkiss* and *Clarence Cottam* No. 4780.

On April 7, 1936 the writer found it, *Zostera marina* and *Ruppia maritima* growing within 5 feet of one another in New River at Peru, Onslow County. Drift of *Halodule* has been observed in Bogue Sound, Carteret County, North Carolina, where, for a few miles, there is an overlap in the ranges of this sub-tropical species and the boreal *Zostera.* Although J. K. Small's "Manual of the Southeastern Flora," 1933, indicates that *Zostera* grows southward as far as Florida, the writer has been unable to confirm its occurrence south of New River, North Carolina. *Halodule* has also been found in great abundance in the Texas coastal lagoons: Aransas Bay, near Rockport, Aransas County, Texas, January 25, 1936, *N. Hotchkiss* No. 4856; and Laguna Madre, West of Port Isabel, Cameron County, Texas, March 6, 1936, *N. Hotchkiss* No. 4876. Small's Manual records the species only from southern Florida.

Halophila Engelmannii Aschers. Aransas Bay, near Rockport, Aransas County, Texas, January 25, 1936, *N. Hotchkiss* No. 4858; and (in drift) Laguna Madre, west of Port Isabel, Cameron County, Texas, March 6, 1936, *N. Hotchkiss* No. 4877.

Small's Manual records it only from Florida.

Thalassia testudinum Koenig and Sims. Drift in Aransas Bay, near Rockport, Aransas County, Texas, January 25, 1936, *N. Hotchkiss* No. 4857.

Small's Manual records it only from Florida.

Echinochloa polystachya (H. B. K.) Hitchc. Determined by Jason R. Swallen, United States Bureau of Plant Industry. Delta Migratory Waterfowl Refuge, Pilottown, Plaquemines Parish, Louisiana, October 29, 1937, *John J. Lynch.*

Mr. Lynch watched the development of this coarse, perennial species in the Mississippi Delta marshes from March to November, 1937. Local people have had it under observation for several years and it appears to be spreading rather rapidly. It is here recorded from the United States for the first time, having been found heretofore from the West Indies and San Luis Potosí, Mexico, south to Argentina.

Scirpus acutus Muhl. Lake Mattamuskeet, Hyde County, North Carolina, June 13, 1929, *N. Hotchkiss* and *L. E. Ekvall* No. 3743; and Neabsco Creek (arm of the Potomac River), Prince William County, Virginia, October 14, 1938, *N. Hotchkiss* No. 6107.

There appear to be no records from so far south along the East coast as the Potomac River; and the species is not included in Small's Manual.

Scirpus californicus (C. A. Meyer) Britton. Combahee Plantation, Whitehall, Colleton County, South Carolina, May 10, 1928, *F. M. Uhler;* and Grassy Lake, Hempstead County, Arkansas, December 2, 1937, *N. Hotchkiss* and *John J. Lynch* No. 5797.

Small's Manual indicates the range of the species as Florida to Texas and California.

Aneilema nudiflorum (L.) Kunth. Determined in the Division of Plant Exploration and Introduction, United States Bureau of Plant Industry. Minim Island, Santee Delta, Georgetown County, South Carolina, October 7, 1935, *N. Hotchkiss* and *C. Cottam* No. 4776.

Small's Manual reports this introduced species from Florida and Georgia. The present locality is more than half way up the South Carolina coast, and the plant appeared to be at home along the margin of a marsh. The presence of an unidentified commelinaceous seed in abundance in duck stomachs taken in that locality in 1931 and earlier, the contents of which were studied in the Biological Survey, led to a search for the plant and its ultimate identification as this species.

Centaurium spicatum (L.) Fernald. Blackwater Migratory Bird

Refuge, 10 miles south of Cambridge, Dorchester County, Maryland, June 27, 1938, *N. Hotchkiss* No. 5924.

Professor Fernald informs the writer that this is the first record of the species between Nantucket, Massachusetts and Norfolk, Virginia. It appeared as much at home along the margin of a road through a brackish marsh as does its relative, *Sabatia*.

BACOPA ROTUNDIFOLIA (Michx.) Wettst. (*Macuillamia rotundifolia* (Michx.) Raf.). Lake Mattamuskeet, Hyde County, North Carolina, June 13, 1929, *N. Hotchkiss* and *L. E. Ekvall* No. 3742.

Neither Small's Manual nor F. W. Pennell's "The Scrophulariaceae of Eastern Temperate North America," 1935, reports this species from any of the East Coast States.

BUREAU OF BIOLOGICAL SURVEY
Washington, D. C.

THE FIRST RECORDED OCCURRENCE OF DISTICHLIS SPICATA IN THE CENTRAL INTERIOR OF THE UNITED STATES

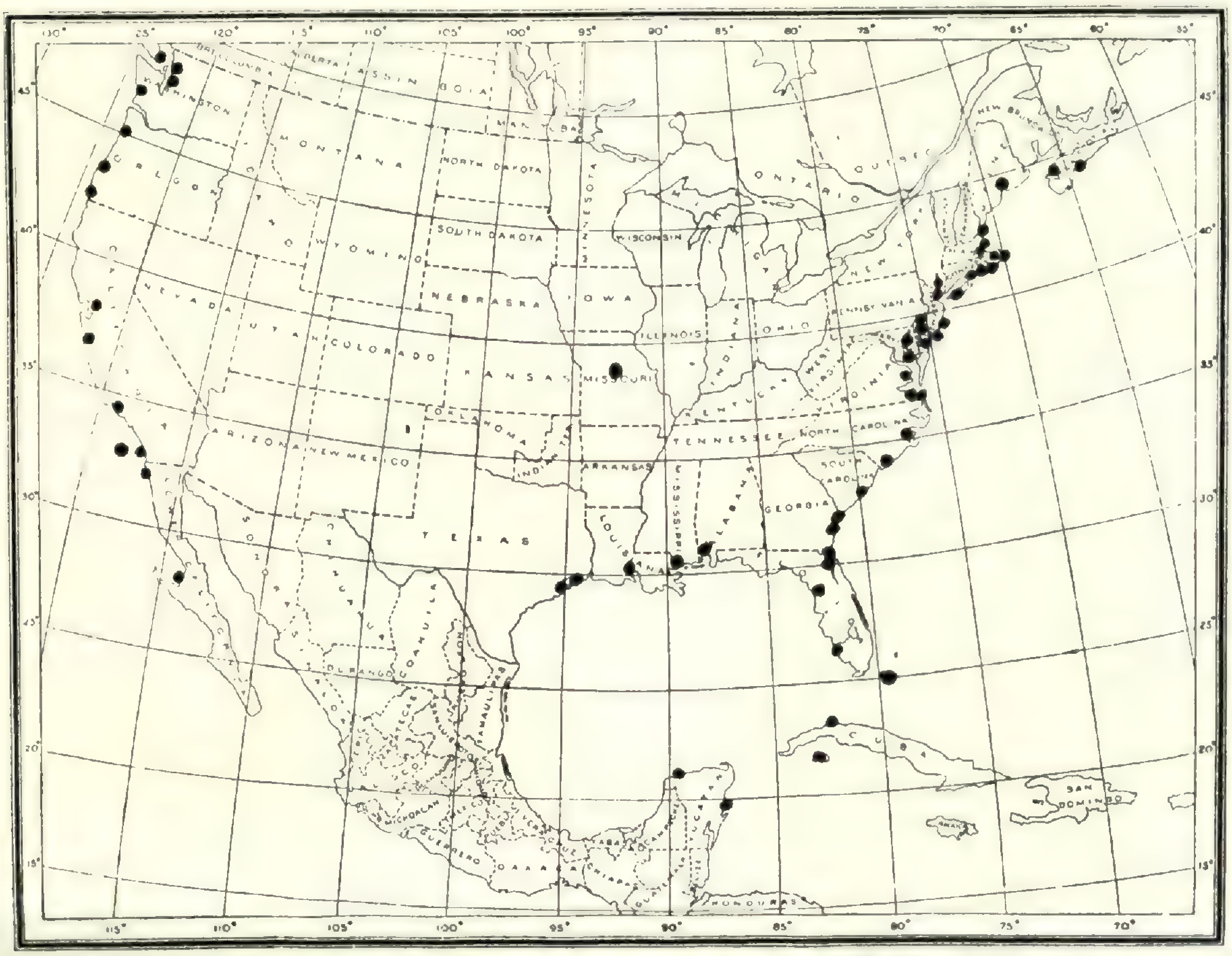
JULIAN A. STEYERMARK

THE GEOGRAPHICAL distribution of *Distichlis spicata* in the United States is more or less coincident with the location of salt marshes along the Atlantic, Gulf, and Pacific coasts. The distributional map of this species in the United States in A. S. Hitchcock's Manual of the Grasses[1] shows it following the seacoasts, although Mr. J. R. Swallen, Agrostologist of the Bureau of Plant Industry at Washington, D. C., in a letter to the writer, states that it is known also from a few inland localities in Texas.

In Missouri the only species of *Distichlis* previously recorded was *Distichlis stricta* (Torr.) Rydb., a plant of alkaline soil of the interior, chiefly the western half of the United States, from Saskatchewan and Minnesota to eastern Washington, south to Missouri, Oklahoma, Texas, California, and Mexico. In Missouri it is known, not from alkaline soils, but rather from cinders and clay soil along railroads where it has been introduced into the western part of the state in Buchanan and Jackson counties.

[1] A. S. Hitchcock, Manual of the Grasses of the United States. U. S. D. A. Misc. Publ. **200**: p. 177, fig. 350. 1935.

While collecting in the fall of 1938 in Saline County, central Missouri, the writer discovered a large grass-covered area in the valley of Heath's Creek bordering salt springs and salt licks. The "flat" had the appearance of salt marshes which I had seen along some of the estuaries of the New England coast. In this particular valley in Missouri, the salt grass took full possession of the area and gave it a



DISTRIBUTION OF DISTICHLIS SPICATA IN THE UNITED STATES

pale green color. For several acres it covered the valley bottom to the exclusion of all other plants. At first I thought I had found a new county record for *Distichlis stricta* and that here was a natural salt-lick habitat for it. Subsequent examination of the flowers and comparison with herbarium material revealed the plants to be actually *Distichlis spicata*. Specimens sent to Dr. M. L. Fernald and Mr. Jason R. Swallen were verified as *D. spicata*. The Missouri record is, therefore, the first known to the central interior of the United States.

This isolated salt marsh in central Missouri, along with others in Saline, Cooper, and Howard counties, is a good example of the interior

isolation and possible stranded relic nature of a number of maritime species. Around a nearby salt spring were growing brackish-water plants, such as *Typha angustifolia* L., *Eleocharis parvula* (R. & S.) Link, var. *typica* (according to Dr. H. K. Svenson), *Zannichellia palustris* L. var. *major* (Boenningh.) Koch, and *Scirpus campestris* Britton, var. *paludosus* (A. Nels.) Fern. All these species occur in brackish or salt marshes along the Atlantic coast and are rare inland, especially in the case of *Eleocharis parvula* var. *typica*. That the salt lick in Saline County revealed the very surprising natural stand of *Distichlis spicata* and that it had escaped the attention of botanists in Missouri and elsewhere for over a hundred years seems almost remarkable, and is one further proof of the need for extensive exploration of not only Missouri, but other states.

The writer's collection is from the valley of Heath's Creek, east of Elk Lick Springs, Sect. 17, 3 miles southwest of Ridge Prairie, Saline County, Oct. 6, 1938, *J. A. Steyermark 21581*, and specimens have been deposited in Gray Herbarium, Missouri Botanical Garden Herbarium, Herbarium of Field Museum, and the Agrostology Herbarium of Smithsonian Institution.

FIELD MUSEUM OF NATURAL HISTORY,
Chicago, Illinois

ABOUT UTRICULARIA PURPUREA.—In Mr. G. B. Rossbach's paper on "Aquatic Utricularias" (RHODORA **41**: 121. 1939) I read that *U. purpurea* has recently been "found in Montreal Co., Quebec." Inasmuch as the author draws the inference that "it grows near the city of Montreal, and therefore in the low valley of the St. Lawrence River, as is to be expected of a generally coastal plain plant extending northward," I think it useful to make a correction.

There is no such thing as a Montreal County in Quebec. We know *U. purpurea* in Quebec not in the low valley of the St. Lawrence River, nor south of the St. Lawrence River, but in the boggy lakes of the Laurentian mountains north of Montreal, at some elevation over the floor of the valley. The nearest known station is about forty miles north of Montreal, and the northernmost at least one hundred miles. We have yet made no attempt to explain this striking disruption of range, but indications are that the migration is through the Ottawa hydrographic system.—FR. MARIE-VICTORIN, Université de Montréal.

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Gray Herbarium of Harvard University, Cambridge, Mass.

H pl.588

Photo. L. Lundberg

Type of "Roripa hispida (Desv.) Britton, var. glabrata Lunell," × $\frac{2}{5}$.

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JOURNAL OF

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THE AMERICAN VARIETIES OF *RORIPPA ISLANDICA**

F. K. Butters and E. C. Abbe

In 1928 Fernald[1] pointed out the differences between the Old World *Rorippa islandica* (Oed. ex Murr.) Borbás (*R. palustris* (L.) Bess.)[2] and the common American plant which had been passing as *R. palustris*. At the same time he took up for the latter plant the name *Rorippa hispida* var. *glabrata* Lunell.[3] Two years later Marie-Victorin[4] interpreted Lunell's variety in the same sense. He differed from Fernald, however, in his views of the specific limits within this group, and accordingly published the new combination *Rorippa palustris* var. *glabrata* (Lunell) Vict.

Recently, an attempt to clear up the identity of certain Minnesota specimens belonging to the *Rorippa islandica* complex led us to an

* Contribution from the Herbarium of the University of Minnesota.

[1] See M. L. Fernald, Rhodora xxx. 131 (1928).

[2] In the paper cited above Fernald maintained the name *Rorippa islandica* for the European plant. Later (Rhodora xxxi. 17, 1929) he withdrew this name on the ground that the combination *Sisymbrium islandicum* Oeder, Fl. Dan. Tab. 409 (1768), upon which it is based, was not validly published. This combination was, however, validated by J. A. Murray in a paper in the *Novi Commentarii societatis regiae scientiarum Gottingensis* iii. p. 81 (1773). Murray attributes the combination *Sisymbrium islandicum* to Oeder, quotes Oeder's doubtful diagnosis, "Sisymbrium (islandicum ?) siliquis brevibus" etc. and then discusses Oeder's question as to whether the plant might be only a variety of *S. sylvestris*. His final conclusion, "Ob hasce notas, quae junctae nec in aliam Sisymbrii speciem quadrant, singularem ea constitui debere speciem arbitror," is perfectly definite. Murray's paper was presented July 4, 1772 but the date on the title page of the volume of *Commentarii* for 1772 is 1773, and the preface is dated April 20 of that year. This still leaves the date of the valid publication of *Sisymbrium islandicum* four years ahead of Pollich's *S. palustris*. Apparently the valid name of the species is *Rorippa islandica* (Oeder ex Murray) Borbás (see Rhodora xxxi. 18).

[3] J. Lunell, Bull. Leeds Herb. no. 2: 6. (1908).

[4] Frère Marie-Victorin, Le genre Rorippa dans le Québec. Contrib. Lab. Bot. Univ. Montréal no. 17: 15 (1930).

examination of Lunell's type of "*Roripa hispida* var. *glabrata,*" now in the Herbarium of the University of Minnesota. To our surprise it proved to be not the common narrow-podded glabrous plant of eastern North America, but quite a different plant with unusually large, short-ellipsoid pods and nearly entire upper leaves (see Plate 588).

Lunell's original description is extremely brief: "**Roripa hispida (Desv.) Britton**, var. **glabrata Lunell**, n. var. The whole plant shining, glabrous. Occasionally among the main form." Incidentally not one of the four plants on his type sheet (clearly designated as such) is wholly glabrous. One of them is nearly so, though with about a dozen bristly hairs just below the inflorescence, while the other three are sparingly hispid throughout the upper half of the stem and on the auricles and midribs of the leaves. The plants appear to have been partly flooded earlier in the season (there was a piece of *Lemna trisulca* entangled among the roots of one of them), and are entirely denuded of leaves for 15–20 cm. at the base. All but one of the leaves present are rhombic-lanceolate or narrowly elliptic, rounded at the apex, nearly entire, slightly sinuate, or occasionally with one or two poorly marked teeth toward the base. The single exception, the lowest leaf still present on one of the plants, though only 2½ cm. long, including the petiole, has two fairly marked, rounded teeth on each side toward the base and a spatulate terminal lobe.

It is to be noted that at the time that Lunell described this variety he was collecting both of the common eastern varieties and was naming them "Roripa palustris" and "Roripa hispida" respectively, and he evidently thought of his new variety as a glabrous form of the latter, which is evidently very close to its true status. We should be inclined to relegate it to the status of a form but for the following considerations: First, it seems to have a geographical distribution of its own. While it apparently does not occur at all in the eastern range of *Rorippa islandica* var. *hispida*[1] it is of wide distribution in the far west, though judging from the small number of specimens, it is far from common. Aven Nelson's *Roripa terrestris globosa* was founded on essentially similar specimens from Idaho and Wyoming. We have

[1] Rorippa islandica var. **hispida,** comb. nov., *Brachilobus hispidus* Desv., Journ. Bot. iii. 183 (1814), *Nasturtium palustre* var. *hispidum* (Desv.) Gray, Man. ed. 2, 30 (1856).

We are following essentially the specific concept of Marie-Victorin (loc. cit.). Our reasons will be discussed later in this paper. We introduce this note here to avoid misunderstanding or unnecessary circumlocution in speaking of the various entities.

examined a sheet of his type number, and it agrees closely with Lunell's type, though the siliques are somewhat smaller and rounder, and the leaves a little more toothed.

Second. The foliage of the Lunell plant does not appear to owe its peculiarities entirely to the aquatic habitat. We have seen a specimen from New Mexico (*A. A. and E. Gertrude Heller* 3743, Santa Fe, June 22, 1897), evidently not aquatic, which has several of the basal leaves present. They are moderately pinnatifid with 2 or 3 pairs of small, oblong, round-tipped basal lobes and a large, rhombic, crenately toothed terminal lobe. From about the middle of the plant upward the leaves in this as in the Lunell plants are almost entire.

Third. Lunell's description of the plant as "shining" is hardly obvious in dried specimens, but all the specimens which we have seen have thickish leaves (probably somewhat fleshy in life) with unusually plane surfaces, and obscure lateral veins. They may well have been "shining" in the living condition.

Fourth. Most of the specimens of this entity have a large number of tricarpellate and tetracarpellate siliques. This is the abnormality which led Turczaninow to describe a new genus, Tetrapoma, for certain related Asiatic forms. It is very common in the long-podded *R. islandica* var. *occidentalis*[1] of the north Pacific coast and is reported by Busch as common in the Siberian plants which he calls "*Nasturtium hispidum* f. *Tetrapoma*,"[2] but we have not noted it in our ordinary eastern *R. islandica* var. *hispida*.

For these reasons Lunell's plant seems to be sufficiently distinct from var. *hispida* to be treated as a distinct though closely related variety. As far as American plants are concerned, Lunell's varietal name seems to be the oldest. Some of the fruits of Siberian plants figured by Busch[3] under the name "*Nasturtium palustre* var. *microcarpum* Rgl." are very similar to those of var. *glabrata* and the plants are described as glabrous. This combination, published, according

[1] Rorippa islandica var. **occidentalis** comb. nov., *Nasturtium terrestre* var. *occidentale* S. Wats. in Gray, Synoptical Flora i. 148 (1895); *Roripa pacifica* Howell, Fl. Northwest Am. 40 (1903); *Rorippa palustris* var. *pacifica* G. N. Jones, Univ. Wash. Publ. Biology v. 161 (1936).

Howell's *R. pacifica* was based directly on Watson's variety. Though Howell does not mention it, his change in the name was undoubtedly due to the fact that the name *R. occidentalis* was preoccupied by a Californian species. If treated as a variety of *R. islandica*, however, there is no bar to the use of Watson's varietal name and it should be restored.

[2] N. Busch. Flora Siberiae et orientis extremi, xxv. Cruciferae. 207. (1915).

[3] N. Busch, loc. cit., p. 202. However the stigmas shown in Busch's drawings are more capitate than those of our plant.

to Busch in 1861, of course greatly antedates Lunell's, but from the very meager information available it is impossible to say whether the plants are in all respects identical. It seems best therefore for the present to retain Lunell's varietal name for the west American plant as follows:

Rorippa islandica var. **glabrata**, comb. nov. *Rorippa hispida* var. *glabrata* Lunell, Bull. Leeds Herb. no. 2: 6 (1908). *Rorippa palustris* var. *glabrata* (Lunell) Victorin, loc. cit. p. 15 as to name only. *Roripa terrestris globosa* A. Nels., Bot. Gaz. 52: 264 (1911).—North Dakota to Idaho, south in the Rocky Mountains to New Mexico. The following specimens have been seen: North Dakota: Leeds, Benson Co., July 1, 1907, *J. Lunell* (type); same place and collector, July 22, 1909 and July 27, 1909. Idaho: Falk's Store, Canyon Co., July 22, 1910, *J. F. Macbride*, no. 275 (type collection of *Roripa terrestris globosa*); Twin Falls and Shoshone Falls, July 25, 1911, *A. Nelson and J. F. Macbride*, no. 1318. New Mexico: Santa Fe, June 22, 1897, *A. A. and E. Gertrude Heller*, no. 3743.

This disposition of *R. hispida* var. *glabrata* Lunell leaves our common North American glabrous plant with narrow pods without a name, and we are proposing to call it *Rorippa islandica* var. *Fernaldiana*[1] after Professor M. L. Fernald who first definitely pointed out the distinctions between this and the European form of the species.

To the differences pointed out by Fernald may be added that the silique in this American plant is frequently narrowly ovoid rather than elliptic-cylindric, and that it averages 2.6 times as long as wide, while the well-developed lower siliques of European plants average 3.6 times as long as wide (the upper siliques in any given inflorescence are apt to be somewhat shorter), more nearly cylindric, and often a little falcate.

In regard to the specific or varietal character of these differences there is certainly room for difference of opinion. In 1928 Fernald treated the American plants as varieties of one species, and the European (occurring also sparingly in northeastern North America) as another. Two years later Marie-Victorin treated them all as varieties and forms of a single species. Similar disagreement is found in recent treatments of Asiatic forms. Thus Busch[2] maintains in

[1] Rorippa islandica var. **Fernaldiana**, nom. nov. Planta glabra vel fere glabra, plerumque crassa, foliis haud tenuibus, iis inferioribus lyrato-pinnatifidis vel crasse pinnatim dentatis praesertim ad basin, lobo terminali ovato majore, iis superioribus minus dentatis vel subintegris; siliquis longe ellipsoideis vel ovoideis, ca. 2.5-plo longioribus quam latis.—*Roripa hispida* var. *glabrata* Fernald, loc. cit., p. 133, not Lunell. *Rorippa palustris* var. *glabrata* Victorin, loc. cit., p. 15, as to the plant described, not as to the name-bringing synonym.

Type in Herb. Minn., Wet places, Ft. Fairfield, Maine. *M. L. Fernald*, July 6, 1893.

[2] N. Busch, loc. cit. pp. 201–209 (1915).

Siberia "*Nasturtium palustre*" with a var. *genuinum* (long-podded) and a var. *microcarpum* (short-podded) and "*Nasturtium hispidum*" with two forms, while Hultén[1] regards them all as varieties of "*Nasturtium palustre.*" It seems that the exact relation of the plants of this intricate plexus can only be settled by some one who has access to large collections of specimens from various parts of both hemispheres and who is also willing to grow the various forms experimentally and thus eliminate the large ecological differences which undoubtedly occur within each of the genetic categories.

Specifically, what is the behavior of these plants in eastern Siberia between Lake Baikal and the Pacific where typical *Rorippa islandica* and var. *hispida* both occur? The figures of the two plants in Busch's treatment show the same differences in leaf form that obtain between European and North American plants of these entities, but do they maintain these differences consistently? At least we know that the fruit distinctions break down in that region, for Busch's figures of the fruits of the glabrous "*Nasturtium palustre* var. *microcarpum* Rgl." are very similar to the fruits of American var. *hispida.*

Another reason for treating all these entities as varieties of a single species is that a certain number of specimens appear in a large collection which do not fit well into any of the described forms, and often combine the characters of two or more of them. This seems more consistent with the view that the whole plexus forms a single polymorphic species. Some of these peculiar forms rather suggest hybrids, but the requisite parents have the disconcerting habit of being half the world away, and it seems more probable that they represent merely unusual genetic combinations, possibly separation of usually linked genes, or expression of recessive characters that are submerged in nearly all the members of the local population.

It may be well to describe a few of these unusual specimens that we have noted:—

1. A plant collected by *Chas. C. Deam,* at Vanemons Pond, Wells Co., Ind. July 8, 1900. The leaves, both basal and upper, are essentially like those of European *R. islandica* including their thin texture, but the whole plant is strongly hispid. The pods are variable, some of them resembling var. *hispida,* others var. *Fernaldiana.*

2. Two collections from the central Rocky Mountain region: *Aven Nelson* 1415, Pole Creek, Wyoming, and *Marcus E. Jones* 505, Georgetown, Colo. In both of these the leaves are quite as thin as in any

[1] Eric Hultén, Flora of Kamtchatka and the adjacent islands. ii. 150 (1928).

European plant, but in other respects the plants are quite typical var. *Fernaldiana*. The Wyoming specimen is in flower only, the Colorado one in nearly mature fruit.

3. A plant from Portland, Oregon (*E. P. Sheldon*, no. 10972) with the foliage of the European type and the fruits of var. *hispida*. The whole plant is glabrous except for a very few hispid hairs on the auricles of the lower leaves.

4. A Minnesota plant from recently filled-in ground adjacent to Duluth harbor (*Olga Lakela*, no. 1501, July 9, 1936). The foliage is essentially that of var. *Fernaldiana*, the siliques are those of var. *glabrata* or in some cases intermediate between the latter and the Pacific coast var. *occidentalis*. Like both of these varieties it has numerous tricarpellate siliques. Its seeds are 0.9 mm. long, a size met elsewhere only in var. *glabrata*. From its habitat this plant is probably an introduction, or possibly a hybrid between introduced var. *glabrata* and the native var. *Fernaldiana*.

In making this study certain taxonomic criteria have been tested and it seems desirable to put on record briefly the results obtained.

Size and Shape of Pods: Absolute size of pods has very little significance except in certain extreme forms. The shape, reduced to a ratio $\frac{\text{Length}^1}{\text{Width}}$, is much more significant, and serves about as well to separate typical *R. islandica* from var. *Fernaldiana* as to separate the latter from var. *hispida*. In each case there is a certain amount of overlap. In this respect var. *glabrata* is very similar to var. *hispida*. The data are summarized in the following table:

	No. specs. m's'd	Pod length (mm.)		Pod width (mm.)		Pod length / Pod width	
		Aver.	Extremes	Aver.	Extremes	Aver.	Extremes
European							
R. islandica	14	6.8	4.2–10.7	1.9	1.3–2.4	3.6	3.1–5.5
var. Fernaldiana	42	4.3	3.0– 6.4	1.6	1.2–2.5	2.6	2.0–3.4
var. hispida	24	3.4	2.2– 4.6	2.1	1.7–2.8	1.6	1.1–2.2
var. glabrata	13	4.8	2.8– 5.5	2.7	1.9–3.7	1.8	1.3–2.9

Length of Style: In this character each variety shows certain tendencies, but there is so much overlapping that this character is far from diagnostic. It is apparently a genetic character, and is very uniform for each individual. In var. *Fernaldiana*, the length of the style is moderately variable (0.2) 0.3–0.6 (0.7) mm., with a quite normal distribution about the mean length of 0.5 mm. In each of the

[1] Length of pod was measured exclusive of the style.

other American varieties there is a tendency toward a bimodal curve, some plants being distinctly short-styled and others long-styled. Thus in var. *hispida* about a third of the plants examined have style-lengths of 0.45–0.50 mm., a slightly larger group have style-lengths of 0.7–0.8 mm., and nearly all the rest have still longer styles (up to 1.1 mm.). Only one plant out of 30 has a style-length between 0.5 and 0.7 mm. In var. *glabrata* most of the plants measured have style-lengths of 0.7–0.8 mm., but one plant has styles 1.1–1.4 mm. long. The total number of plants of this variety that we have seen is too small to give a clear picture of their variability in this feature. European *R. islandica* is very variable in this respect, but we have not measured enough plants to get any reliable statistics. The style-length in the dozen that we have seen varies from 0.25–0.80 mm. with a mean of 0.55 mm. and no particular evidence of dimorphism.

Shape of the Style: There seems to be a slight difference in this respect in the several varieties, but it is a little difficult to express in any quantitative fashion.

Shape of the Stigma: In European *R. islandica* the stigma is distinctly capitate, usually nearly 0.1 mm. wider than the upper end of the style. Judging from Busch's figures the same is true of the Siberian specimens.[1] In var. *Fernaldiana* the stigma is usually subcapitate, but less widened than in the European plant. In var. *hispida* and var. *glabrata* the stigma is about the same width as the top of the style, or often a trifle narrower.

Seed Characters: The surface of the seed is the same in all varieties. The shape and size vary a little, but scarcely significantly. The following table summarizes the dimensions as we have ascertained them:

	No. specs. m's'd	Seed length (mm.)		Seed width (mm.)	
		Average	Extremes	Average	Extremes
European R. islandica	9	0.58	0.5–0.7	0.47	0.40–0.55
var. Fernaldiana	34	0.52	0.4–0.6	0.44	0.35–0.45
var. hispida	23	0.60	0.5–0.7	0.44	0.35–0.50
var. glabrata	8	0.70	0.6–0.9	0.50	0.40–0.70

It is to be noted that in var. *hispida* and var. *glabrata* the seeds are somewhat longer in proportion to their width than in the other

[1] N. Busch, loc. cit. p. 202. It is notable that the only one of Busch's figures (fig. 5) which does not show the capitate style comes from South America! The others are all Siberian.

varieties, and in var. *glabrata* the seeds are distinctly larger than any of the others. These larger seeds are also more rounded in outline and less angular than those seen elsewhere in the species, but the difference is not very clear-cut.

All of these points seem to be of a "more or less" type, and therefore to indicate varietal rather than specific differences. The other differences noted by Fernald are wholly vegetative (shape, cutting, and texture of leaves and size of plant), occasional exceptions occur as noted above, and the vegetative characters do not always correlate with the reproductive ones. We are therefore inclined to feel that the differences between European *R. islandica* and the ordinary American forms are of the same order of magnitude as those between the various American forms and that the most satisfactory tentative treatment is that of Marie-Victorin—to regard all the major variants as varieties of a single polymorphic world-wide species.

DRABA APRICA IN THE OZARKS OF SOUTHEASTERN MISSOURI

Julian A. Steyermark

When Dr. Fernald revised *Draba* in Temperate Northeastern America,[1] the question arose as to whether *Draba brachycarpa* Nutt. var. *fastigiata* Nutt. should be included as a synonym under *D. aprica* Beadle. Specimens of this rare species had been collected by Beadle on Kenesaw Mountain, Georgia, in 1901, and again by Dr. Perry and Mr. Myers in 1934. Nuttall's type of *D. brachycarpa* var. *fastigiata* supposedly came from Arkansas, but there was some doubt as to whether his specimens actually came from Arkansas or from Georgia, because plants of *D. brachycarpa* from localities in Georgia were present on the same sheet as were the specimens collected by Nuttall. In view of such circumstances, the likelihood of confusion of data was possible. Students of the Arkansas flora were, therefore, urged to watch for the possible occurrence of this species in that state.

In the spring of 1939, while collecting along the Black River, in Reynolds County, southeastern Missouri, in an area which is threatened to be flooded by the construction of a dam, the writer chanced upon a strange-looking *Draba* growing in low open rocky woods in a

[1] Fernald, M. L., Draba in Temperate Northeastern America. Rhodora **36**: 361–363. 1934.

broad valley of Black River. It was growing with typical *Draba brachycarpa* Nutt., but its taller unbranched stellate-hairy stems, remote and abbreviated corymbs arising from the middle and upper axils, together with the stellate-hairy siliques marked it as distinct from the commonly encountered *D. brachycarpa.*

Subsequent examination of the collection proved it to be *Draba brachycarpa* var. *fastigiata* Nutt., the same as *D. aprica* Beadle, and specimens were sent to Dr. Fernald for verification. In a letter received from him concerning the specimens, he states, "Your *Draba* is the best kind of *D. aprica* Beadle. It pretty clearly demonstrates that Nuttall's *D. brachycarpa* var. *fastigiata,* which has been a sort of spook, must have been a very dwarfed specimen of the same thing.

"We now have *D. aprica* in northern Georgia, Arkansas, and southeastern Missouri, which gives it a real range."

In other words, the collection of the Missouri specimens shows that *D. aprica* is not limited to Georgia, and that Nuttall's collection of *D. brachycarpa* var. *fastigiata* from Arkansas was authentically labelled, in view of the occurrence of the plant in the adjacent Ozarks of southeastern Missouri.

The writer's Missouri collections of this plant are in the Gray Herbarium and the Herbarium of Field Museum. They are taken from two counties: (1) St. Francis Shut-ins, 14 miles south of Fredericktown, Madison County, April 27, 1930, *J. A. Steyermark 1750;* and (2) growing with *D. brachycarpa* (22096) in alluvial low woods along Black River, between the mouth of Cave Spring Hollow and Logslide Bluff, T29N, R2E, Sect. 13 and 24, 6 miles northwest of Piedmont, Reynolds County, April 30, 1939, *J. A. Steyermark 22097.*

Field Museum of Natural History
Chicago, Illinois

THE GENUS ELLISIA

Lincoln Constance

Ellisia Nyctelea L., now generally recognized as a member of the tribe *Hydrophylleae* of the *Hydrophyllaceae,* was usually placed with various members of the *Boraginaceae* in pre-Linnean works. Linnaeus first attempted to fit the species into *Ipomoea,* then into *Polemonium* and finally took it as the basis for his genus *Ellisia,* with the comment, "Proprii generis planta est." However, he had previously used the

name *Ellisia* to designate a group of plants commonly referred to *Duranta* L. of the family *Verbenaceae*. Thus, *Ellisia* was from the first a homonym in the *Hydrophyllaceae* and additional names were substituted by later authors, so that *E. Nyctelea* has appeared under five different genera subsequent to the adoption of the binomial system of nomenclature.

Trew[1] proposed the names *Macrocalyx* (in reference to the accrescent fruiting calyx) and *Colpophyllus* (descriptive of the dissected leaves), both presumably based upon *E. Nyctelea*. Scopoli[2] segregated the genus *Nyctelea* from *Ellisia* because he thought the former to possess solitary seeds and the latter, two seeds in each capsule. The type species of *Nyctelea*, however, was the same as the original species of *Ellisia*, namely *E. Nyctelea*. Fortunately, *Ellisia* has now been conserved over all other names for this genus.

The writer[3] has proposed to retain *Ellisia* as a monotypic genus, removing *E. chrysanthemifolia* Benth., *E. micrantha* (Torr.) Brand and *E. Torreyi* Gray to *Eucrypta* Nutt. and *Ellisia membranacea* Benth. to *Pholistoma* Lilja. The disposition of those plants which have been erroneously referred to *Ellisia* is summarized in the section of the present article entitled "species excluded."

The reasons for the segregation of *Eucrypta* and *Pholistoma* have been fully presented in the paper herein cited. The species comprising *Eucrypta* possess placentae which are bifacially ovuliferous, a character sharply differentiating them from any other member of the same tribe. *Pholistoma* and *Ellisia* have closely similar fruits and seeds, but the characteristic prickly succulent and scandent habit of the former genus and its restriction to the southwestern United States and adjacent Mexico are but two of the more obvious features effectively dividing the two genera. *Ellisia* is about equally close to *Pholistoma* and to *Nemophila* Nutt., and Baillon[4] actually merged all three genera, together with the species of *Eucrypta* that were known to him, under *Ellisia*. The writer believes these to be distinct natural genera whose incorporation would subordinate and mask important points of difference between species-assemblages which may very possibly have had quite distinct points of immediate origin.

Many specimens of *Ellisia Nyctelea* examined have been labeled

[1] Nov. Act. Nat. Cur. 2: 332 (1761).
[2] Introd. Hist. Nat. 183 (1777).
[3] Madrono 5: 28–33 (1939).
[4] Hist. des Pl. 10: 397 (1891).

"weed," and the occurrence of this plant in cultivated or disturbed soil has been similarly indicated. For this reason it would seem likely that at least the edges of the distributional pattern may be blurred by sporadic introduction. Occurrences which are *known* to be adventive are excluded from the accompanying map. *Leersia lenticularis*, *Panicum meridionale* and its var. *albemarlense*, *Festuca paradoxa* and *Carex crus-corvi*, as mapped by Fernald,[1] although they usually occur to the southeast, afford a precedent for species predominantly of the prairies and plains of the interior reappearing upon the Atlantic coastal plain. The existence of such a discontinuity in range might suggest that the plant is adventive near mouths of rivers. This may well be the case, but two difficulties with this explanation should not be overlooked: (1) that the species was collected "in Virginia," by Clayton, prior to 1753, and at Harper's Ferry, by Pursh, in 1806; and (2) that although *E. Nyctelea* occurs widely on the dry plains of Wyoming and elsewhere, its most eastern localities appear to be only in humid situations along streams.

The writer is grateful to Mr. Reed C. Rollins, of the Gray Herbarium, who has painstakingly combed the obscure literature pertaining to this and related genera, and to Mr. Ira W. Clokey, South Pasadena, who has lent specimens for examination. The curators of the following herbaria have been most kind in lending the material in their care: California Academy of Sciences (CA); Cornell University (CU); Field Museum of Natural History (F); Gray Herbarium (G); Royal Botanic Gardens, Kew (K); Missouri Botanical Garden (M); New York Botanical Garden (NY); Oregon State College (OS); Pomona College (P); Academy of Natural Sciences, Philadelphia (PA); Rocky Mountain Herbarium, University of Wyoming (RM); Dudley Herbarium, Stanford University (S); University of California (UC); University of Oregon (UO); United States National Herbarium (US); University of Washington (UW); State College of Washington (WS).

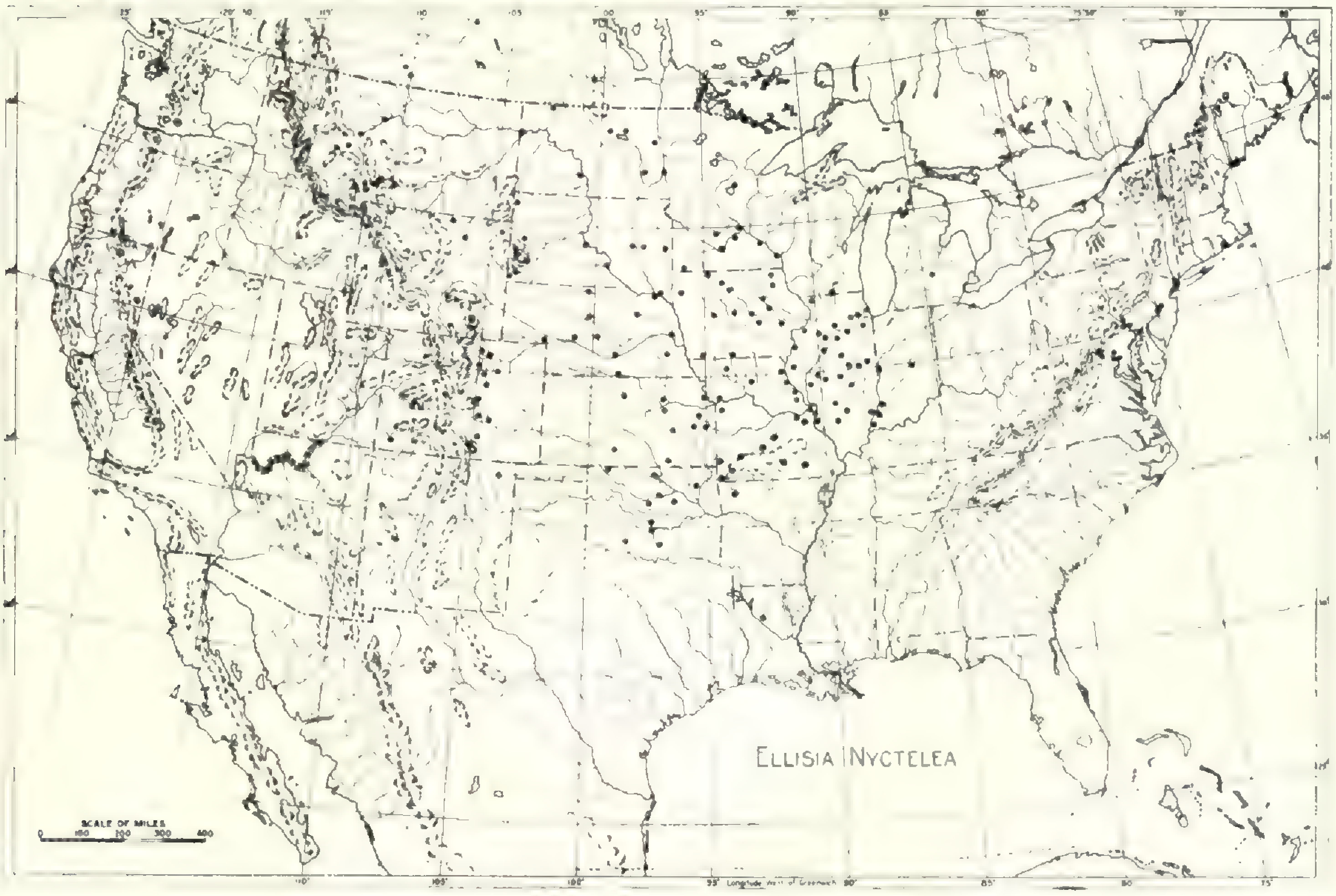
Taxonomic Treatment

Ellisia Nyctelea L. *Ipomoea Nyctelea* L., Sp. Pl., ed. 1, 160 (1753); *Polemonium ? Nyctelea* L., Sp. Pl., ed. 2, 231 (1762); *Ellisia Nyctelea* L., op. cit., 1662 (1763); *E. ambigua* Nutt., Gen. **1**: 118 (1818); *Macrocalyx Nyctelea* O. Kuntze, Rev. Gen. **1**: 434 (1891); *E. Nyctelea* var. *coloradensis* Brand, Pflanzenr. IV. **251**: 39 (1913); *Nyctelea Nyctelea* Britt. in Britt. & Br., Ill. Fl., ed. 2, **3**: 67 (1913); *N. ambigua*

[1] Rhodora **39**: 349, map 22; 478, maps 43 and 46; 327, maps 6 and 9 (1937).

Standley, Proc. Biol. Soc. Wash. **32**: 143 (1919); *N. americana* Moldenke, Bull. Torrey Club **59**: 156 (1932).—Delicate annual, simple or diffusely branched, 1–4 dm. high, or reduced and more compact; stems slightly succulent, angled, retrorsely hispid; cotyledons with an oblong-oval blade, 10–15 mm. long, 5–7 mm. broad, tapering slightly at base into a slender petiole of greater length; lowest leaves opposite, the others alternate; the lower oblong to ovate, 3–8 cm. long, 1–3 cm. broad, acute at apex and truncate or subcordate at base, pinnately divided into 7–13 oblong obtuse or acute divisions which are entire or again toothed; uppermost leaves smaller, deltoid-ovate and short-petioled, all sparingly hispidulous on both surfaces, hispid on the margins and on veins below, thin, membranous and venose; petioles of lower leaves about equalling blades, very narrowly winged and slightly clasping at base; flowers solitary, opposite the alternate leaves or several in a few-bracteate, secund, raceme-like terminal cyme; calyx broadly campanulate, cleft nearly to base into 5 lanceolate or ovate-lanceolate lobes, 3–5 mm. long, 1–2 mm. broad, auricles 0, but a sepaloid tooth present in the sinus in some specimens, both sepals and teeth bristly on the margins and more or less hispidulous on the surfaces; corolla 7–8 mm. broad, narrowly campanulate, white or bluish, the 5 oval lobes conspicuously shorter than the tube, the whole corolla shorter than or about equalling the calyx; corolla-scales oblong, minute, the free tips fimbriate; stamens 5, shorter than the corolla-tube, anthers about 0.2 mm. long, oval or oblong; pollen grains smooth, tricolpate; style 1–2 mm. long, cleft less than one-half; mature capsule 5–6 mm. in diameter, 1-celled, globose, hispid with scattered hairs, exceeded by the strongly accrescent, stellate-rotate calyx; seeds usually 4, 2–3 mm. in diameter, globose, dark brown, regularly reticulate; cucullus 0.—TYPE: "Habitat in Virginia. *D. Gronovius* [Clayton]."—Atlantic slope, principally on the Delaware, Susquehanna and Potomac rivers; prairies and plains from Michigan, Saskatchewan and Montana south to Oklahoma and New Mexico.—NEW YORK: Fort Washington, *Bicknell 7301* (NY, PA). NEW JERSEY: Somerset, Mercer Co., *F. J. Hermann 4270* (M). PENNSYLVANIA: Morrisville, Bucks Co., *James* (G, M); opposite Marietta, York Co., *Knipe* (F, PA). MARYLAND: Bald Friar, Cecil Co., *J. J. Carter* (G, NY); Great Falls of the Potomac, *Holm* (F, G). DISTRICT OF COLUMBIA: Washington, *Morong* (M, NY), *Holm* (CA, G). VIRGINIA: Bluemont, Loudon Co., *Standley 13197* (US); Potomac River, Fairfax Co., *Hotchkiss 1934* (CU). WEST VIRGINIA: Harper's Ferry, Jefferson Co., *Pursh* (PA). MICHIGAN: Lansing, Ingham Co., *Yuncker 91* (US). INDIANA: Indianapolis, Marion Co., *Friesner 9596* (F); Crowleyville, Gibson Co., *Deam 50056* (F, G, M, NY). WISCONSIN: Beloit, Rock Co., *T. J. Hale* (F, G, M, PA). ILLINOIS: "Wabash", *Nuttall* (G, ? isotype of *E. ambigua*); Chicago, *H. H. Babcock* (G, US); Oquawka, Henderson Co., *H. N. Patterson* (G, M, NY, OS, PA, UC, US); Wady Petra, Stark Co., *V. H. Chase 1351* (M, PA, US); Peoria, Peoria Co.,

F. E. McDonald (G, NY, RM, US), *J. R. Churchill* (CU, G, M); Augusta, Hancock Co., *S. B. Mead* (G, M, NY, PA, US); Decatur, Macon Co., *Clokey 2409* (Clokey, M, NY, RM, US); Muncie, Vermilion Co., *Gleason* (CA, G, S). MINNESOTA: Nichols, Aitkin Co., *Sheldon* (G, NY, UC, US, WS); Winona, Winona Co., *Holzinger* (RM, UC, US). IOWA: Armstrong, Emmet Co., *Cratty* (M, NY, PA, S, US); Ames, Story Co., *Ball & Preston 468* (G, M, RM, US); Grinnell, Poweshiek Co., *M. E. Jones* (CA, G, M, P, RM, S, UC, US).



Map 1. Geographical Distribution of ELLISIA NYCTELEA

(Map used through the courtesy of the Standard Process & Engraving Co., Berkeley, California)

MISSOURI: Courtney, Jackson Co., *Bush 7922* (M, PA, S); St. Louis, *N. Riehl 184* (K, M, NY), *Eggert* (F, M, P, RM, UC, UO, US); Noel, McDonald Co., *E. J. Palmer 5427* (CU, M, P). ARKANSAS: "Arkansas," *Pitcher* (NY, PA); "N. W. Arkansas," *F. L. Harvey 196* (US). MANITOBA: Portage la Prairie, *Macoun & Herriot* (G). SASKATCHEWAN: *Bourgeau* (G, K); Medicine Hat, *Macoun 5544* (M, NY, US). NORTH DAKOTA: Lake Ibsen, Benson Co., *Lunell* (G, NY, RM); Fargo, Cass Co., *Bolley 160* (CU, G, NY, PA, RM). SOUTH DAKOTA: Fort Meade, *Forwood 362* (US); Fort Pierre, *Geyer 53* (K), *447* (US); Oreville, etc., *Rydberg 887* (G, K, NY, US). NEBRASKA: Fort Niobrara, *Wilcox* (NY); Lincoln, Lancaster Co., *J. L. Morrison 987* (M, US). KANSAS: Riley Co., *J. B. Norton 340* (G, M, NY, RM, US);

Osborne City, Osborne Co., *C. L. Shear 48* (F, G, NY, US); Paola, Miami Co., *Oyster* (CA, M). Oklahoma: "On the False Washita, between Fort Cobb and Fort Arbucle," *E. Palmer 193* (NY, US); Alva, Woods Co., *G. W. Stevens 694* (G, M, NY, S, US); Fort Sill, Comanche Co., *Clemens 11740* (CA, M, RM). New Mexico: Sierra Grande, Union Co., *Standley 6162* (US). Colorado: Fort Collins, Larimer Co., *Crandall 1596* (F, M, RM, US); Cerro Summit, Montrose Co., *C. F. Baker 154* (G, M, NY, P, RM, S, UC, US, isotypes of *E. Nyctelea* var. *coloradensis*); Sangre de Christo Creek, Castilla Co., *Rydberg & Vreeland 5751* (NY, RM). Wyoming: Sheridan-Buffalo, *Tweedy 3505* (NY, RM, WS); Hulett, Crook Co., *L. O. Williams 2372* (G, M, US, WS); Halleck Canyon, Albany Co., *A. Nelson 7425* (G, M, NY, P, RM, US); Pole Creek, *A. Nelson 141* (CU, G, M, NY, P, RM, US). Montana: Fort Benton, *Pearsall 895* (US); Belt River, etc., *R. S. Williams 127* (NY, US); mouth of Shields River, *Scribner 166* (G, PA); Bozeman, Gallatin Co., *Blankinship 534* (F, M, PA); Pony, Madison Co., *Rydberg & Bessey 4858* (F, NY, US). Alberta: Rosedale, *M. E. Moodie 910* (Clokey, F, G, M, NY, RM, S, US).

The priority and validity of the specific name *Nyctelea* has not been questioned, and only the elevation of this epithet to generic rank, producing the tautonym *Nyctelea Nyctelea*, has made room for the introduction of alternate specific names. *E. ambigua* has generally been regarded as a slender and probably immature plant of *E. Nyctelea*. If that be the case, as the present writer is convinced it is, then *ambigua* would be the next available name for this species if *Nyctelea* were to supersede *Ellisia* in generic status. This was the avowed reason for the combination, *Nyctelea ambigua* Standley. Moldenke coined *N. americana* to fill the same supposed gap, apparently unaware that Standley's new name (to which Moldenke refers) had already closed it, and made *N. americana* a name totally unnecessary under any known code. With the conservation of *Ellisia*, the binomial *E. Nyctelea* is firmly established for this much named plant.

A supposed extreme western representative of the species, with a depressed and more pubescent habit and shorter styles, was the basis for var. *coloradensis* Brand. Even some of the isotypes do not conform to Brand's description, but pass readily into the usual slender and diffuse form. Typical *E. Nyctelea*, moreover, occurs much farther west than the type locality of the supposed variety, and the alleged varietal distinctions seem to be only habital modifications associated with a less favorable environment.

Species Excluded

1. *Ellisia chrysanthemifolia* Benth., Trans. Linn. Soc. **17**: 274 (1834). Eucrypta chrysanthemifolia (Benth.) Greene.

2. *E. fremontii* (Elmer) Brand, Pflanzenr. IV. **251**: 41 (1913). Nemophila pulchella Eastw. var. **fremontii** (Elmer), n. comb. (*N. fremontii* Elmer, Bot. Gaz. **41**: 319 (1906).)

3. *E. membranacea* Benth., op. cit., **17**: 274 (1834). Pholistoma membranaceum (Benth.) Constance.

4. *E. membranacea* var. *hastifolia* Brand, op. cit., 38 (1913). Pholistoma membranaceum (Benth.) Constance.

5. *E. micrantha* (Torr.) Brand, op. cit., 42 (1913). Eucrypta micrantha (Torr.) Heller.

6. *E. microcalyx* Nutt., Trans. Amer. Philos. Soc., n. s., **5**: 191 (1832). Nemophila microcalyx (Nutt.) F. & M.

7. *E. ranunculacea* Nutt., op. cit., 191 (1832). Phacelia **ranunculacea** (Nutt.), n. comb.

This name has always been considered a synonym of *N. microcalyx*, but Nuttall mentions "racemes 5–10?-flowered," whereas the flowers of *N. microcalyx* are always solitary. The reason for the confusion of Nuttall's two species seems to lie in the similarity of their leaf-form, which has led to their being mixed on herbarium sheets, even those in Nuttall's collections. An examination of a photograph of the type of *E. ranunculacea* at the British Museum and of authentic material at the Gray Herbarium, at Kew and at Philadelphia, clearly shows that *E. ranunculacea* is not only a *Phacelia*, but is conspecific with the plant that has been known as *P. Covillei* Wats. The Nuttallian name was validly published more than fifty years before that of Watson, and must, accordingly, supersede it.

8. *E. Torreyi* Gray, Proc. Amer. Acad. **20**: 302 (1885). Eucrypta chrysanthemifolia var. bipinnatifida (Torr.) Constance.

9. *E. Torreyi* var. *bipinnatifida* (Torr.) Brand, op. cit., 42 (1913). Eucrypta chrysanthemifolia var. bipinnatifida (Torr.) Constance.

10. *E. Torreyi* var. *Orcuttii* Gray, Synop. Fl. **1**, pt. 2, 413 (1888). Eucrypta chrysanthemifolia (Benth.) Greene.

11. *E. Torreyi* var. *paniculata* Brand, op. cit., 41 (1913). Eucrypta chrysanthemifolia (Benth.) Greene.

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NOTES ON THE FLORA OF WORCESTER COUNTY, MASSACHUSETTS—II

David Potter, N. P. Woodward, G. H. Pride and F. H. Howard

The first of this series of "Notes on the Flora of Worcester County, Massachusetts" was published in 1935.[1] Since that time botanical work has been actively carried on within the county which has added over 7000 sheets of Worcester County plants to the herbarium of the Hadwen Botanical Club and increased our knowledge of the known flora of the region by the following list of plants new to the county.

In addition to the list of plants new to the county, it is worthwhile noting that several rare plants have been found in other townships than those mentioned by Jackson,[2] or rediscovered after a lapse of several years.

Pellaea atropurpurea was first reported from the county in 1900 from the town of Berlin (Rhodora **2**: 14). This reference was used by Jackson in 1909 in his "Flora of Worcester County." This past summer what is apparently the original locality was revisited and specimens have been placed in the Herbaria of Clark University and the Worcester Natural History Society. This is the only known station in the county for this very rare fern.

Malaxis unifolia has been reported from Athol and Spencer in addition to former stations in Auburn, Worcester, Upton, Paxton, and Boylston. This seems to be a rather rare and local orchid. *Liparis liliifolia* holds the distinction of being one of the rarest plants in the county. Only one plant in one locality in Sturbridge is known. This single plant has persisted for several years. Jackson lists *Habenaria blephariglottis* from Princeton and *Orontium aquaticum* from Dudley and Princeton. No report since his time has come from Dudley; but it seems rather obvious that his station in Princeton was really in Holden for both these plants have been reported from the same place in this town very close to the Princeton border. This single station for *H. blephariglottis* has been known for many years, but *Orontium* was not reported since Jackson until 1917, and not again until the summer of 1938 when specimens were placed in the Herbarium of the Hadwen Botanical Club.

[1] Potter and Woodward; Notes on the Flora of Worcester County, Massachusetts. Rhodora **37**: 80–88. 1935.

[2] Jackson, Joseph; Flora of Worcester County, Massachusetts. Worcester Nat. Hist. Soc., 3d ed. 1909.

The rare and very local *Clematis verticillaris* is listed by Jackson from Brookfield and Warren. These two stations seem to have disappeared. It was reported from Southbridge in 1928, and only two other stations, one in Hardwick and one in Sutton, are known for the county.

Jackson lists *Cardamine parviflora* from Mt. Wachusett in 1909. Since then it has been found on Mt. Dan in Sturbridge in 1934, 1935, and 1938.

Euphorbia Preslii, reported from Millbury in 1909 by Jackson, was not reported again until 1934, from West Warren.

Jackson's station of *Pedicularis lanceolata* in Leicester is still known and one new station from Uxbridge was added in 1935.

The imposing *Vernonia noveboracensis,* a more commonly southern and western plant, has appeared in Blackstone, Mendon and Uxbridge.

Liatris spicata was first reported for New England in 1932 from Worcester. In 1937 a new station of one plant was reported again from Worcester and another in North Brookfield where several specimens were well established.

Two albino forms are worth noting. *Prunella vulgaris* forma *albiflora,* formerly reported only from Worcester and Princeton, was found in Auburn last summer; and *Polygala paucifolia* forma *alba,* formerly found only in Auburn in 1913, now is known from Millbury and Hubbardston.

The authors wish to extend their sincere thanks to all those who have aided in this work. Special thanks are due to Mrs. Mary C. Dodge for her unfailing interest and careful work and to Mrs. D. L. Salter for her contributions to the families *Cyperaceae* and *Gramineae* as well as for her aid in many other ways.

The plants enumerated in the following list are arranged by families according to the system used in Gray's Manual, 7th edition. In each case the species listed is accompanied by the name of the person who first discovered and reported the plant as growing within the county, the township where found, the date of finding, and, where an herbarium sheet exists, its deposition. For this purpose the following key is used.

C. The Herbaria of Clark University and the Hadwen Botanical Club.
W. The Herbarium of the Worcester Society of Natural History.
G. The Gray Herbarium and the Herbarium of the New England Botanical Club.

Osmunda cinnamomea L., forma frondosa (Torr. & Gray)

Britton. W. Worcester, May 9, 1899, *Cora Fairchild Ball.* Also C., no. 4676, Worcester, July 28, 1936, *W. B. Brierly.*

Pinus sylvestris L. C., no. 1092, Ashburnham, July 17, 1933, *W. H. Hodge.*

Sparganium chlorocarpum Rydb., var. acaule (Beeby) Fernald. G., no. 60477, Athol, October 2, 1930, *Alfred S. Goodale.* C., no. 4661, brook running into Cedar Pond, Sturbridge, Aug. 1, 1933, *David Potter and Walter H. Hodge.*

Digitaria ischaemum (Schreb.) Muhl. G., no. 2910, Southbridge, September 10, 1894, *Weatherby, Weatherby & Smith.* C., no. 5114, river bank, Lancaster, Sept. 8, 1936, *David Potter.* (*D. humifusa* Pers. of Gray's Manual, 7th ed. See Hitchcock, Manual of the Grasses of the U. S.)

Panicum linearifolium Scribn. C., no. 4672, Peat Meadow, Worcester, June 18, 1930, *D. L. Salter.* Also C., no. 4675, East Hubbardston Road, Princeton, June 5, 1933, *D. L. Salter,* and C., no. 4827, Sturbridge, July 15, 1935, *Mrs. D. Comins.*

Panicum boreale Nash. G., no. 1115, Worcester, June 22, 1911, *K. M. Wiegand.* C., no. 4671, Peat Meadow, Worcester, June 18, 1930, *D. L. Salter.*

Panicum spretum Schultes. C., no. 4668, growing in water, North Pond, Milford, June 21, 1931, *D. L. Salter.*

Panicum tennesseense Ashe. C., shore of North Pond, Milford, June 21, 1931, *D. L. Salter.* Also C., no. 4673, East Hubbardston Road, Princeton, June 5, 1933, *D. L. Salter.*

Hierochloë odorata (L.) Wahlenb. C., no. 8666, Westboro, May 21, 1937, *Cyrus Darling.*

Eragrostis capillaris (L.) Nees. C., no. 5859, Worcester, July 12, 1936, *D. L. Salter.*

Festuca octoflora Walt. G., one sheet from Uxbridge, *H. G. Jesup* ex herb. Wm. Francis Flint. C., no. 4877, Sturbridge, June 24, 1934, *D. L. Salter.*

Cyperus Houghtonii Torr. C., no. 4544, Lancaster, Aug. 24, 1934, *D. L. Salter.*

Carex Crawfordii Fernald, var. vigens Fernald. G., no. 4126, South Royalston, July, 1899, *James A. Bates.* C., no. 4538, Lancaster, Aug. 24, 1934, *D. L. Salter.*

Carex interior Bailey. C., no. 8647, Westboro, May 27, 1934, *D. L. Salter.*

Carex brunnescens Poir. C., no. 4560, Hardwick, May 21, 1933, *D. L. Salter.* Also C., no. 4581, Sturbridge, June 3, 1934, *Mrs. D. Comins* and C., no. 4555, Barre, June 7, 1935, *David Potter.*

Carex setacea Dewey, var. ambigua (Barratt) Fernald. C., no. 5812, Sturbridge, July 25, 1936, *Mrs. D. Comins.*

Carex panicea L. C., no. 2704, Bolton, June 3, 1933, *R. H. Lombard.*

Hemerocallis flava L. Leicester, June 8, 1935, *Mrs. Mary C. Dodge.* No herbarium sheet.

Tulipa Gesneriana L. W., Dudley, June 10, 1869, *F. E. Kimball.* Also Worcester, May 9, 1925, *N. P. Woodward.* A garden escape.

Convallaria majalis L. W., a pink-flowered form, Worcester, May 11, 1936, *Erford Newcomb.*

Tricyrtis hirta Hook., var. nigra Hort. C., no. 5698, Worcester, Sept. 28, 1936, *R. S. Illingworth.* A stand of about thirty plants growing in open woods.

This plant is illustrated and described in Flore des Serres, vol. 15, second series, no. 5, pl. 1540. 1862–1865. The following excerpt is taken from The Dictionary of Gardening, p. 87: "A small genus (five species) of half-hardy perennials, with short creeping rhizomes, natives of the Himalayas, Japan, and China."

Pogonia ophioglossoides (L.) Ker., forma albiflora Rand and Redfield. Oxford, July 7, 1928, *Earl W. Bemis.* See Flora of Mt. Desert, 152. 1894.

Carya ovalis (Wang.) Sarg. W., Worcester (Tatnuck), Feb. 12, 1936, *Clarence W. Kinney.* (*C. microcarpa* in part, of Gray's Manual, 7th ed.)

Bassia hyssopifolia (Pall.) Ktze. C., no. 5006, Peat Meadow, Worcester, Aug. 13, 1936, *Mrs. M. C. Dodge.* One plant found Sept. 29, 1935 and about thirty plants Aug. 13, 1936. Native of Southern Europe and the Levant.

Silene antirrhina L., var. divaricata Robinson. C., no. 6415, Shrewsbury, Aug. 1, 1937, *Mrs. Mary C. Dodge.*

Delphinium grandiflorum L., var. album Hort. W., Worcester (Webster Square), July 20, 1935, *Norman P. Woodward.* Spontaneous; 3 or 4 plants.

Aconitum Napellus L. W., Dudley, July 20, 1869, *F. E. Kimball.*

Dicentra spectabilis Lem. W., Dudley, June 10, 1869, *F. E. Kimball.*

Hydrangea paniculata Sieb. W., waste land, Worcester, Aug. 22, 1925, *Norman P. Woodward.* Plants still standing.

Deutzia scabra Thunb., var. plena Rehd. C., no. 8668, Leicester, July 2, 1937, *G. H. Pride.* Persisting for many years on the site of what was probably an old nursery.

Physocarpus opulifolius (L.) Maxim., var. luteus Kirchn. W., Peat Meadow, Worcester, June 4, 1938, *Norman P. Woodward.*

Spiraea Thunbergii Sieb. W., Peat Meadow, Worcester, April 24, 1927, *Norman P. Woodward.* Established in waste land, persists.

Spiraea van Houttei Zabel. W., Peat Meadow, Worcester, June 6, 1934, *Norman P. Woodward.*

Malus robusta Rehder (*M. baccata* × *pumila:* see Rehder's Man. Cult. Trees and Shrubs, p. 394, 1927). W., waste land on June Street, Worcester, July 16, 1938, *Norman P. Woodward.*

Amelanchier laevis Wiegand in Rhodora, **14:** 157. The common

species of the county, with glabrous leaves purplish on expanding. *A. canadensis* of Jackson's Flora in great part.

Amelanchier Bartramiana (Tausch) Roemer. Reported as growing on Mt. Wachusett, Princeton, by Nuttall. See Wiegand, Rhodora **14:** 160. In the herbarium of the New England Botanical Club represented from Ashburnham (*Knowlton*) and Hubbardston (*Weatherby*).

Filipendula rubra (Hill) Robinson. W., waste land, Worcester, July 14, 1937. *Norman P. Woodward.* 3 plants.

Filipendula Ulmaria (L.) Maxim. W., Dudley, July 22, 1869, *F. E. Kimball.*

Cladrastis lutea (Michx. f.) Koch. W., Worcester, July, 1933, *Doris E. Whittle.* 3 young saplings, spontaneous.

Trifolium pratense L., forma leucochraceum Asch. & Prantl. C., no. 7774, Worcester, Aug. 13, 1938, *G. H. Pride.* Also W., Worcester, Aug. 31, 1938 and Sept. 17, 1938, *Norman P. Woodward.*

Lathyrus latifolius L. W., old cellar hole, West Auburn, July 13, 1912, *Norman P. Woodward.* Also W., Worcester, June 23, 1934, *Norman P. Woodward.* A white-flowered form has been collected for several years by Mr. Woodward.

Oxalis montana Raf., forma rhodantha Fernald. W., Princeton, July 7, 1936, *Mrs. M. C. Dodge.* Rhodora, **22:** 143.

Euonymus europaeus L. Worcester, June 4, 1930, *Mrs. Mary C. Dodge.* An escape well established.

Acer pseudoplatanus L., var. purpureum Loudon. W., Worcester, June 23, 1937, *Norman P. Woodward.* Several young saplings growing spontaneously under a *Forsythia* hedge. Leaves green above and red-brown below. See Rehder's Man. of Cult. Trees and Shrubs, p. 566, 1927.

Impatiens biflora Walt., forma Peasei A. H. Moore. C., no. 5016, Sterling, Aug. 21, 1936, *Mrs. Mary C. Dodge.* A large stand by roadside on Prescott St. Corolla cream-color, with numerous and coalescent pink spots. Rhodora, **19:** 115.

Impatiens biflora Walt., forma citrina Weatherby. C., no. 3547, Worcester, Aug. 16, 1934, *Mrs. Mary C. Dodge.* Also C., no. 4139, Shrewsbury, Aug. 29, 1935, *Mrs. Mary C. Dodge.* Rhodora, **19:** 115.

Rhamnus Frangula L. W., spontaneous on the old Kinney Farm, Worcester (Tatnuck), May 30, 1934, *Clarence W. Kinney.*

Rhamnus davurica Pall., var. nipponica Mak. W., Old Kinney farm, Worcester (Tatnuck), Nov. 4, 1935, *Clarence W. Kinney.*

Professor Rehder states that this is the first specimen of this rare, far Eastern shrub to be reported to the Arnold Arboretum as found growing spontaneously in this country. This species was introduced into the Arnold Arboretum over fifty years ago. See Rehder's Man. of Cult. Trees and Shrubs, p. 591, 1927.

Malvastrum coccineum (Pursh) Gray. W., Worcester, June, 1889, *Kitty Ida Fish.* Escaped from cultivation.

Hypericum prolificum L. C., no. 3038, West Brookfield, July 18, 1933, *W. H. Hodge.*

Hypericum boreale (Britton) Bicknell. G., Douglas, October 29, 1911, *Fernald.* C., no. 2546, Sterling, July 22, 1933, *W. H. Hodge.* Also C., no. 2829, Webster, Aug. 7, 1933, *W. H. Hodge;* and C., no. 5275, Shrewsbury, Sept. 22, 1934, *David Potter.*

Viola cucullata Ait., forma albiflora Britton. G., Leominster, May 30, 1914, *Fernald & Bean.* C., no. 5262, Southboro, May 13, 1936, *David Potter.* Bull. Torr. Bot. Club, **17**: 124, 1890.

Viola fimbriatula Sm., forma albescens Farwell. C., no. 4302, Upton, May 25, 1935, *Mrs. Mary C. Dodge.* 3 plants with pure white flowers. Am. Mid. Nat., **11**: 66, 1928.

Viola lanceolata L. × primulifolia L. C., no. 4278, Worcester, June 22, 1935, *Mrs. Mary C. Dodge.*

Elaeagnus angustifolia L. W., Peat Meadow, Worcester, June 24, 1938, *Norman P. Woodward.*

The Arnold Arboretum states, "We have no specimens of escapes from this region and are glad to have your specimens as a record. We had it only from Missouri and New Mexico as an escape." The Gray Herbarium writes, "We have no specimens of *Elaeagnus angustifolia* as an escape from anywhere in North America . . . Cordial thanks for the specimens."

Oenothera parviflora L. G., Uxbridge, September 9, 1878, *J. W. Robbins* (as *O. Oakesiana*). W., Peat Meadow, Worcester, Aug. 6, 1938, *Norman P. Woodward.* Several plants.

Myriophyllum humile (Raf.) Morong, forma capillaceum (Torr.) Fernald. C., no. 2827, Webster Lake, Webster, Aug. 7, 1933, *W. H. Hodge.* Also C., no. 5814, Coachlace Pond, Clinton, Aug. 19, 1936, *David Potter;* C., no. 7911, Rutland, Sept. 28, 1938, *F. H. Howard;* C., no. 7909, Lake Samoset, Leominster, Oct. 1, 1938, *F. H. Howard;* C., no. 7910, Grafton, Oct. 12, 1938, *F. H. Howard.*

Astrantia major L. W., Berlin, July 17, 1934, *Mrs. Charles M. Field.* A garden escape.

Aegopodium Podagraria L. W., Hadwen Park, Worcester, June 30, 1934, *Norman P. Woodward.* A fine stand of several plants near pond.

Daucus Carota L., forma roseus Farwell. W., Peat Meadow, Worcester, Aug. 22, 1918, *Norman P. Woodward.* Rep. Mich. Acad. Sci. **21**: 369, 1920.

Hottonia inflata Ell. C., no. 6921, Cedar brook, Westboro, June 12, 1937, *Cyrus Darling.*

Ligustrum vulgare L. Worcester, May 24, 1938, *Mrs. Mary C. Dodge.* Waste ground and edge of woods. Three widely separated stations.

Heliotropium europaeum L. W., Worcester, June, 1886, *Kitty Ida Fish.* Spontaneous in garden.

Verbena bracteosa Michx. C., no. 5045, Worcester, July 27, 1936, *R. H. Lombard.*

Teucrium canadense L. W., border of wet woods, Worcester, Aug. 1, 1934, *Norman P. Woodward.*

Physostegia virginiana (L.) Benth., var. alba Hort. W., Peat Meadow, Worcester, Aug. 14, 1937, *Norman P. Woodward.* Flowers a pure white. A fine station. See Bailey's Cyc. Hort., vol. III, p. 1328, 5th ed., 1906.

Lamium amplexicaule L. C., no. 3629, Worcester, Oct. 3, 1934. A cleistogamous form.

Salvia patens Cav. W., Dudley, June 12, 1869, *F. E. Kimball.*

Mentha Pulegium L. Waste ground, Stafford St., Worcester, Sept. 19, 1935, *Mrs. Mary C. Dodge.* No herbarium sheet.

Physalis Alkekengi L. C., no. 5015, Peat Meadow, Worcester, June 21, 1936, *Mrs. M. C. Dodge.*

Chelone Lyoni Pursh. W., Worcester, Sept. 15, 1937, *Norman P. Woodward.* A fine colony, spontaneous and spreading. Rare in New England.

Ilysanthes anagallidea (Michx.) Robinson. G., Southboro, September, 1881, *Walter Deane.* W., C., no. 6249, Millbury, June 29, 1935, *Mrs. M. C. Dodge.*

Veronica virginica L. W., Dudley, July 1, 1869, *F. E. Kimball.*

Castilleja coccinea (L.) Spreng. A form with yellow floral leaves, growing with the type. W., Worcester, no date, *Edith Billings.*

Catalpa bignonioides Walt. W., Worcester, July 2, 1938, *Mrs. M. C. Dodge.* Fully established.

Martynia fragrans Lindl. C., no. 5009, Grafton, Sept. 7, 1936, *Mrs. Mary C. Dodge.* Stray in cultivated ground.

Dianthera americana L. C., no. 5124, swamp, Holden, Aug. 2, 1936, *Cyrus Darling.*

Galium sylvaticum L. W., Worcester, Aug. 22, 1936, *Norman P. Woodward.* Spontaneous in grassland.

Lonicera tatarica L. G., North Leominster, May 30, 1914, *Fernald & Bean.* C., no. 7350, Auburn, April 24, 1938, *O. L. Seaver.* Also C., no. 7349, pasture, Shrewsbury, May 17, 1938, *M. E. Marlborough.*

Sambucus canadensis L., forma chlorocarpa Rehder. W., Hadwen Lane district, Worcester, Sept. 2, 1934, *Roger H. Hardy.* Four scattered shrubs. See Rehder's Man. Cult. Trees and Shrubs, p. 797, 1927.

Professor Rehder writes, "The plant is in cultivation at this Arboretum and was raised from seed collected near Wilmington Junction, N. H. Your specimen represents the second station for this form, and constitutes the first *spontaneous specimen* in our Herbarium." (Sept. 11, 1934.)

Lagenaria vulgaris Ser. Peat Meadow, Worcester, Sept. 20, 1936, *Mrs. Mary C. Dodge.* Noted again in 1937. No herbarium sheet.

Lobelia cardinalis L., forma alba (A. Eaton) St. John. W., West Upton, 1890, *Kitty Ida Fish.* Also C., no. 4188, Uxbridge, Sept. 1, 1935, *Dr. M. R. Sharpe.* Rhodora, **21**: 217.

Lobelia cardinalis L., forma rosea St. John. Brook-bed, Worcester, July 16, 1917, *Mrs. Frank E. Lowe.* Rhodora, **21**: 217.

Aster novae-angliae L., forma geneseensis House. W., Peat Meadow, Worcester, Sept. 18, 1935, *Norman P. Woodward.*

Aster vimineus Lam., var. foliolosus (Ait.) Gray. W., Peat Meadow, Worcester, Aug. 31, 1936, *Norman P. Woodward.* Rays lilac-tinged.

Aster puniceus L., var. firmus (Nees) T. & G. W., Worcester, Sept. 14, 1936, *Norman P. Woodward.*

Helianthus annuus L., var. bicolor Cockerell. W., Peat Meadow, Worcester, Aug. 31, 1936, *Norman P. Woodward.* Rays red-brown. Two widely separated stations.

Erechtites hieracifolia (L.) Raf., var. intermedia Fernald. W., Worcester, Aug. 18, 1934, *Norman P. Woodward.* Rhodora, **19**: 27.

Erechtites hieracifolia (L.) Raf., var. prealta (Raf.) Fernald. W., Worcester, Aug. 18, 1934, *Norman P. Woodward.* Rhodora, **19**: 27.

Arctium minus (Hill) Bernh., forma leucocephalum House. W., Worcester, Aug. 8, 1919, *Norman P. Woodward.* Bull. N. Y. State Mus. **243–244**: 41, 1923.

Clark University
Worcester, Mass.

NEW PLANTS FROM KENTUCKY

E. Lucy Braun

Arabis **perstellata,** sp. nov. Planta perennis, e basi ramosa; ramis in anthesi 1–5 dm. post anthesim 3–3.5 dm. longis dense stellato-pubescentibus per omnes partes griseis; foliis radicalibus parvis lamina 1–2.5 cm. longa lyrato-pinnatifida petiolo tenui; foliis caulinis valde repando-dentatis vel infimis lyrato-pinnatifidis 1–3 cm. longis 5–8 mm. latis sessilibus basi auriculatis; pedicellis in anthesi 2.5–4 mm. longis deinde elongatis post anthesim ad 8–9 mm. in longitudine; petalis roseis 3–4 mm. longis; siliquis 2 cm. longis.—Wooded hillsides, Elkhorn Creek, Franklin County, Kentucky, May 6, 1936, *Braun,* Ky. no. 1226 (type in Gray Herbarium); April 20, 1939, *Braun,* Ky. no. 2215, and May 11, 1939, *Braun,* Ky. no. 2413 (topotypes distributed to a number of herbaria).

Plant somewhat similar in aspect to *A. dentata*, but perennial and of smaller size, decidedly gray due to the dense fine stellate pubescence, *both* surfaces of basal and cauline leaves stellate-pubescent, somewhat more densely and finely so beneath; cauline and basal leaves smaller. Flowers larger than in *A. dentata*, pink instead of yellowish, and on pedicels about twice as long. Siliques divaricately spreading as in *A. dentata*, but on slender pedicels nearly half the length of the silique. Lacks the coarse aspect of *A. dentata*.

Some variation in height of plants and in leaf-size occurs; stems occasionally 3 dm. high at flowering, and 4 dm. in fruit; leaves on some plants collected in a rainy spring larger than those of type, basal with blades up to 4 cm. in length and pinnatifid only at base, cauline reaching 4 cm. in length, and 1.5 cm. in width including the salient teeth. Foliage of largest-leaved plants less gray but exhibiting same type of pubescence as smaller-leaved plants. Petals 3–4 mm. long, 1.2 mm. wide at apex, erose, claws white, blades varying from light rose-pink to darker with deep purplish-pink veins. Sepals 2.5 mm. long, spreading at right angles to pedicel and petals, forming a cross; long strigillose hairs interspersed with the appressed stellate hairs. Flowering pedicels from 2.5 mm. long to 7 mm. long on older flowers, divaricately spreading, or slightly reflexed; raceme at first compact, becoming elongate, not branched. Fruiting pedicels divaricate, siliques straight or slightly curved, slightly inclined upward. Silique faintly nerved for about one-third its length; seeds in one row, not winged; some of the trichomes on silique simple or merely bifurcate, others stellate.

At flowering time, basal leaves from previous season are present. Later, these wither, and a new short leafy shoot develops between the elongate fruiting stems. Late in the summer this appears as a rosette elevated on a stem about an inch long on which a few dry leaves are visible. Additional rosettes may develop from basal buds. The late summer leaves are very densely appressed-stellate-pubescent on both surfaces. On some plants, scars of several series of rosette-leaves are seen on what at first might be mistaken for tap-root, as the rosette axis continues the tap-root axis. Such old and leafless stems may become decumbent and covered by humus and forest litter. Plants of steep wooded hillsides, sometimes on shaded mossy and humus-covered limestone rocks.

Two immature specimens of this species were found in the Gray Herbarium, at one side of a sheet of large-leaved *A. dentata* from

"sandy borders of Ohio River, Kentucky." A pencil line was drawn around these two pieces and, in Dr. Robinson's handwriting, is the annotation "something else." Just below these two pieces, in Asa Gray's writing, is the locality, "N. Kentucky."

ARABIS PERSTELLATA × ARABIS LAEVIGATA (Muhl.) Poir. One plant of an Arabis which appears to be a hybrid between *A. perstellata* and *A. laevigata* was found in the type locality of *A. perstellata*. This plant branches at the base like *A. perstellata*, but one stem is longer and stouter than the others, with branches from some of the leaf-axils and inflorescence. The leaves are elongate and similar in shape to those of *A. laevigata*. Any one stem of this apparent hybrid might be mistaken for *A. laevigata* but for the pubescence. Basal leaves stellate-pubescent on both surfaces, but not densely so. Stem and cauline leaves pubescent with scattered simple, bifurcate and stellate hairs. Pedicels and calyx with long simple hairs. Petals white to pinkish, about one-fourth to one-third longer than the *ascending* sepals. Hybrid specimen (*Braun*, Ky. no. 2216) and specimen of *A. laevigata* from same locality (*Braun*, Ky. no. 2217), deposited in Gray Herbarium.

DRABA RAMOSISSIMA Desv., var. **glabrifolia**, var. nov. Foliis rosularum hiemalium et caulium floriferarum supra fere glabris subtus sparsissime stellato-pubescentibus nitentibus.—Limestone cliffs, Brooklyn Bridge, Kentucky River, Jessamine County, Kentucky, April 17, 1937, *Braun*, Ky. no. 1332 (TYPE in Gray Herbarium, ISOTYPE in author's herbarium).

Draba ramosissima Desv. is a highly variable species, material in the Gray Herbarium consisting of two somewhat unlike groups of plants: one with cauline leaves scarcely reduced in size, or even larger than the basal leaves, and strongly branched inflorescence; the other with the basal rosette prominent, the stem-leaves similar but gradually reduced upward. Leaves vary greatly, from ones merely repand-dentate to those laciniate-toothed or almost pinnatifid. Pubescence varies, some plants so densely stellate-pubescent all over as to appear gray; others, though green, are stellate-pubescent on all surfaces The above variety belongs to that group with pronounced basal rosette, which, in the Brooklyn Bridge plants, is evergreen. Specimens of C. W. Short's, from "cliffs of Ky. river," are similar in growth-habit to the plant described above, but are much more pubescent.

CASSIA HEBECARPA Fernald, var. **longipila**, var. nov., caule sparse villoso per omnes partes; petiolis prope glandulas dense longeque villosis, saepius cum pilis lineam inter glandulam et petioli basin

formantibus; calyce valde villoso cum pilis longis albis.—Dry slopes, Knott County, Kentucky, July 23, 1937, *Braun*, Ky. no. 1633 (TYPE in Gray Herbarium).

The conspicuous long hairs on the petiole near the gland and the long white hairs on the sepals distinguish this variety.

POLEMONIUM REPTANS L., var. **villosum**, var. nov. Planta pubescens per omnes partes cum pilis mollibus aliis glanduliferis aliis eglanduliferis.—Kentucky and Ohio. Woods, Beaver Pond, Adams County, Ohio, April 18, 1930; near Carter P. O., Lewis County, Kentucky, April 14, 1936, *Braun*, Ky. no. 1154; Beaver Pond, Adams County, Ohio, March 25, 1939; Hazel Branch, Lewis County, Kentucky, April 2, 1939, *Braun*, Ky. no. 2178 (TYPE in Gray Herbarium, ISOTYPE in author's herbarium); Ohio Brush Creek, Adams County, Ohio, April 9, 1939; Cave Creek, Pulaski County, Kentucky, April 25, 1939, *Braun*, Ky. no. 2296.

These densely villous plants with stems long-villous, and with inflorescences and the rachises of young leaves so pubescent that they are whitish, present a striking contrast to the nearly glabrous species with shining stems. The variety is so viscid that it adheres to the paper on which it is dried. The long hairs are more widely spaced on leaves and calyx; hairs on the stems sometimes 1–1.5 mm. long. Plant generally of shorter stature than the species, with smaller flowers, and leaflets tending to be broad-elliptic. Pubescence on the radical leaves persists throughout the season. Gradations between the species and variety occur, some plants showing the long hairs on stems, petioles and rachises, but with the inflorescence finely short-puberulent. Occasional plants with shining stems have scattered long hairs; these seem best referred to the species.

Polemonium reptans var. *villosum* is abundant at the western front of the Allegheny Plateau in Adams County, Ohio, and in Lewis and Fleming Counties, Kentucky, where it seems almost to replace the glabrous species.

EUPATORIUM **deltoides**, sp. nov. Caulibus 4–6 dm. altis, glabris; foliis oppositis, valde tenuibus, late deltoideis, latitudine et longitudine aequalibus, maioribus 10 cm. in utramque partem, inaequaliter grosseque dentatis, glabris pilis minutis paucis subtus in costis et in foliorum marginibus exceptis; petiolis laminas longitudine aut omnino aut fere adaequantibus, glabris, vel eis foliorum diminutorum inflorescentiae puberulentibus; foliorum jugo infimo remoto, laminis parvis, 2 cm. longis saepe marcescentibus in anthesi; inferiore nervorum jugo prominente, folii marginem e basi per 5–15 mm. formante, folii basi petiolo proxima late cuneata sed lamina supra partem cuneatam in

formam subcordatam dilatata; apice acuto vel acuminato; corymbo plano, parvo et patente; pedicellis puberulentibus; capitulis ca. 15-flosculis, floribus albis, corollae dentibus apice extus minute pubescentibus; involucro 4 mm. alto, squamis lanceolatis, uniseriatim positis, aequalibus, 1 vel 2 exterioribus ceteris aliquanto brevioribus nonnullisque interioribus tenuissimis et paene hyalinis ceteris longioribus exceptis, usque ad medium binis striis praeditis, parte autem superiore fimbriatis praecipue interioribus, squamarum exteriorum apicibus fusco-viridibus et cuspidatis; achaeniis in anthesi 2–2.5 mm. longis.—KENTUCKY: in moist sandstone rockhouses* of the basal Pottsville formation, usually in company with *Thalictrum clavatum*, *Heuchera parviflora* var. *Rugelii* and *Cystopteris bulbifera*, but much more local in occurrence; near Cumberland Falls, Whitley County, in young flower, September 6, 1939, *Braun*, Ky. no. 2583 (TYPE in Gray Herbarium, ISOTYPES deposited in several herbaria); in bud, Dog Slaughter Creek, Whitley County, September 6, 1939, *Braun*, Ky. no. 2593; vegetative shoots and dry flower-stalks of previous season, near Cumberland Falls, Whitley County, June 25, 1936, *Braun*, Ky. no. 1271, and Tight Hollow, Wolfe County, April 26, 1931, *Braun*, Ky. no. 220.

Eupatorium deltoides belongs to the Urticaefolia group; it is very striking because of its exceedingly thin, broad, long-petioled leaves which have the lower pair of lateral veins prominent, forming the leaf-margin for 5 to 15 mm. from base, the immediate leaf-base broadly cuneate, but blades flaring above vein-margin produce a subcordate base. The leaves are mostly concentrated on the upper half of the stem and always arranged in life in a perfect mosaic inclined slightly to the one-sided light of the peculiar habitat. Though fairly large, the whole plant is so delicate that it probably could not withstand the impact of heavy rain. It is because of the protected situations in which the plant always grows that it is possible to collect dried inflorescences with complete involucres months after flowering.

UNIVERSITY OF CINCINNATI,
Cincinnati, Ohio

* The term "rockhouse" is used to designate a peculiar type of overhang, somewhat resembling the mouth of a cave, which occurs frequently in cliffs of the Pottsville conglomerate. The floor of such rockhouses is sandy, dry or moist depending on seepage; the roof arches in more or less hemispheric form, and cuts off all rain except what may blow in from the side, and all overhead light.

DISTRIBUTIONAL NOTES ON CERTAIN AQUATIC UTRICULARIAS IN QUEBEC

George B. Rossbach

In Rhodora, April, 1939, the writer discussed, among other things, the geographical distribution of northeastern American species of Utricularia. Since that writing I have had occasion to study some aquatic Utricularias from Quebec which Mr. Roger Gauthier of Université de Montréal very kindly loaned to me for identification. Among these specimens are three species of Utricularia, namely U. gibba L., U. purpurea Walt., and U. minor L., all of which exhibit extensions of their ranges as recorded in my last article on the genus. For the most part, these northern locations are well north into Quebec. Almost certainly further extensions will become known when more general collecting of the genus has been done in eastern Canada.

Utricularia gibba L. I recorded as known in the East north to Lunenburg and Yarmouth counties, Nova Scotia, Maine, and Megantic Co., Quebec. Collections of U. gibba in the herbarium of the Université de Montréal from Quebec are as follows: "Saint-Tite: lac Pierre-Paul. Flottant entremêlé en petits paquets, sous *Brasenia Schreberi* etc., dans les parties marécageuses du lac." *R. Gauthier*, no. 2343, Aug. 28, 1934. "Saint-Tite: lac Pierre-Paul. Flottant entremêlé et formant de petites masses sous les feuilles de *Brasenia Schreberi* etc., dans les parties marécageuses du lac." *R. Gauthier*, no. 2275, Aug. 28, 1934. "Saint-Alexis-des-Monts, comté de Maskinongé: lac à la Perchaude, chemin des Pins Rouges. Flottant en petites masses entremêlées, sous *Brasenia Schreberi*. Lac très vaseux." *R. Gauthier*, no. 2212, Aug. 8, 1934. "Saint-Alexis-des-Monts, comté de Maskinongé: lac du Pic Elevé. Dans quelques pouces d'eau. Attaché à plantes aquatiques. Pas remarqué de spécimens flottants. Lac pas marécageux à cet endroit." *R. Gauthier*, no. 2219, Aug. 11, 1934.

In the last writing the known range of U. purpurea Walt. was recorded as north into Nova Scotia, New Brunswick, and Montreal Co., Quebec. But collections in the Université de Montréal add to this northern range the following localities: "Saint-Alexis-des-Monts, comté de Maskinongé: lac du Pic Elevé. Flottant." *R. Gauthier*, no. 2188, Aug. 3, 1934. "Environs de Sainte-Emélie-de-l'Energie: lac à l'Ile, comté de Berthier. (Près de lac à la Raquette.)" *R. Gauthier*,

no. 2158, July 17, 1934. "Saint-Alphonse, comté de Joliette: lac Vert." *R. Gauthier*, no. 596, no. 541, July 13, 1933.

U. MINOR L. was last recorded by the writer as ranging on the Atlantic Coast north to the Straits of Belle Isle, Labrador, through Newfoundland, also on Greenland. It is well represented about the Gulf of St. Lawrence, but seemingly has not been collected appreciably inland in the East north of northern New England, northern New York, and the Lake States. One might well expect U. MINOR to occur, however, north of the United States in Quebec (and in Ontario). Mr. Gauthier has collected plants of U. MINOR from Quebec as follows: "Sainte-Emélie-de-l'Energie; décharge du lac Caribou près du lac à la Raquette (Berthier)." *R. Gauthier*, no. 2571, July 17, 1934. "Saint-Jean-de-Matha, comté de Joliette. Petit lac vaseux près du lac Noir." *R. Gauthier*, no. 2097, July 3, 1934. "Campbell's Bay, comté de Pontiac. Lac à l'ours. Dans 3 pouces d'eau. Légèrement enraciné dans le sable." *R. Gauthier*, no. 2479, July 31, 1935.

All specimens of U. MINOR save the last recorded collection are plants or parts of plants bearing unusually reduced, very slender, nearly all basally one-or two-parted, and sparsely dichotomized leaves upon the younger growth which composes most of these specimens. Also the noticeably slender plants from Campbell's Bay have small portions bearing similarly reduced leaves. Older portions of all specimens, however, do bear the much more usual leaves having basally three parts, more dichotomies, and broader divisions. Though the most reduced leaves resemble those of U. GIBBA, they still are usually coarser and not quite like those of GIBBA in appearance, and their comparatively large bladders are less darkly colored and are much more, in fact nearly quite, homogeneous in size. Several sheets were observed of many of the collections recorded in this article.

STANFORD UNIVERSITY, California.

A NEW SOUTHERN KALMIA.—KALMIA LATIFOLIA L., var. **laevipes**, var. nov., pedicellis glabris vel sparsissime glanduloso-verrucosis.—On or near the Coastal Plain, southeastern Virginia to Alabama. VIRGINIA: wooded slopes along Gordon Creek, east of Barrat's Bridge (or Ferry), James City County, September 19, 1939, *Fernald & Long*, no. 11,393; moist or swampy woods, Little Neck, Princess Anne County, *Fernald & Long*, no. 4111; Suffolk, Nansemond County, July 13, 1895, *J. W. Blankinship;* dry woods of a "hammock," Great

Dismal Swamp, west of Yadkin, August 20, 1939, *Fernald & Long*, no. 11,101 (type in Herb. Gray; isotype in Herb. Phil. Acad.). South Carolina: moist thicket by rocky stream, 8 miles east of Pendleton, Anderson County, August 20, 1927, *Wiegand & Manning*, no. 2371. Georgia: damp shady woods along Savannah River near Sister's Ferry, Effingham County, June 12, 1903, *Harper*, no. 1814. Alabama: rich woods near stream, 8 miles north of Headland, Henry County, August 11, 1927, *Wiegand & Manning*, no. 2370.

Typical and wide-spread *Kalmia latifolia* has the pedicels more or less densely viscid with stalked glands commonly somewhat mixed with glandless trichomes, the clammy pedicels quickly adhering when handled and thus rendering the flowering branches, when brought in from the woods, often unsightly. Var. *laevipes*, in its extreme development, has the great advantage of lacking this viscid indument, the pedicels of the type and of most of the specimens cited being quite smooth or with the merest suggestion of sessile glandular spots. In southeastern Virginia the variety passes by gradual stages into typical *K. latifolia*, but the large shrubs seen in the Great Dismal Swamp were of the extreme variety.

Kalmia latifolia, "Habitat *in* Marilandiae, Pensylvaniae, Virginiae *sylvis declivibus versus rivulos*," started under that name and as the original *Kalmia* in L., Amoen. Acad. iii. 13 (Nova Plantarum Genera) (1751), and was taken up in Species Plantarum (1753) without further elucidation. The original very detailed description (Amoen. Acad.) had "Pedunculi *filiformes, nudi, pilis glutinosis adspersi.*" Linnaeus also cited Gronovius, Catesby and Plukenet. The Gronovian account of **"The common Laurel, vulgarly called Ivy"**, had an inconclusive diagnosis but cited Plukenet's figure (Mant. 49, t. 379, fig. 6) which shows conspicuously pilose pedicels. The Catesby plate (ii. 98) cited by Linnaeus is as it should be, a beautiful illustration of var. *laevipes*. Since the Linnean specimen and original diagnosis and the Plukenet plate were of the common variety with pilose and stipitate-glandular pedicels, I am treating that as the type of the species.—M. L. Fernald.

VII International Botanical Congress.—The Organizing Committee of the Seventh International Botanical Congress which was to be held in Stockholm, 1940, has, on account of the present international situation and in conjunction with the Swedish Government, decided to postpone all preparations for the Congress until further notice. This

means that there will be no Congress during 1940. The Organizing Committee and its Executive have not, however, been dissolved, but will continue in office, and will, at the first opportunity, communicate with the leading botanical circles in different countries with a view to ascertaining a suitable time for the Congress to be held.—

Rob. E. Fries, *President*
Hugo Osvald, *General Hon. Secretary*

Stockholm, October, 1939.

A NEW VARIETY OF TRIPHORA

W. H. Camp

Several years ago the late Professor J. H. Schaffner called my attention to a rather unusual series of specimens of the autumnal flowering orchid *Triphora* which he and Dr. R. B. Gordon had collected near Columbus, Ohio. Shortly before his death, I visited Professor Schaffner and in the course of our conversation he mentioned having again visited the locality where the original specimens were gathered, at least on several occasions and at different times of the year. His conclusions were that the character which first brought the plants to his particular attention was constant from year to year and, therefore, that the plants merited description as being different from the more common *Triphora trianthophora.*

Professor Schaffner's death prevented him from bringing his work on this material to its logical end. I have since taken it upon myself to pursue the matter somewhat further and have come to the conclusion that this material should be given at least varietal rank. I therefore propose the following:

Triphora trianthophora (Sw.) Rydb. var. **Schaffneri** Camp, var. nov. A speciei pedunculis erectis differt.

Separated solely on the basis of erect peduncles I have the following specimens: Ohio: Franklin Co., Bexley, near Columbus, *Robt. B. Gordon & John H. Schaffner,* in fruit, Oct. 20, 1934, type, Britton Herb., N. Y. Bot. Gard. Indiana: along Sugar Creek about 4 miles northwest of Marshall, *C. C. Deam 7202,* in flower, Aug. 21, 1910; Dunreith, *E. Pleas,* in fruit, Oct. 1896; Mattsville, *Guy Wilson,* in fruit, Oct. 1, 1893. Missouri: Jackson Co., along (the) Blue, north of Dodson, *K. K. Mackenzie 452,* in flower, Sept. 13, 1901; Courtney, *B. F. Bush 1788,* in fruit, Oct. 5, 1902. Arkansas: L(ittle) R(ock), without collector (ex Herb. Dr. H. E. Hasse), in flower, Aug. 16, 1885.

Fruiting plants with stiffly erect peduncles reminiscent, at least in this character, of the coarser Caribbean *Triphora surinamense* (Lindl.) Britton of which I have seen specimens from Dominica, Porto Rico and Guadeloupe. Unfortunately, I have not been able to examine authentic flowering material of this new variety, but was informed by Professor Schaffner that the flowering peduncles of plants from the type locality were also erect and not nodding or drooping as is generally the case in the more common and typical form of *trianthophora*.

Apparently, var. *Schaffneri* is scattered in, roughly, the northwestern portion of the range of the species and is likely to be met with in a somewhat wider area than indicated by the specimens here cited.

Since the above was written, Professor Fernald has kindly loaned me his recently received photograph of the type of *Arethusa parviflora* Michx. Examination of this photograph reveals that, in some cases at least, the pedicels have been twisted out of their natural position prior to pressing and thus simulate the above described variety. It is therefore my opinion that *Arethusa parviflora* Michx. (1803) is a straight synonym of *A. trianthophora* Sw. (1800) [= *Triphora trianthophora* (Sw.) Rydb.].—W. H. C.

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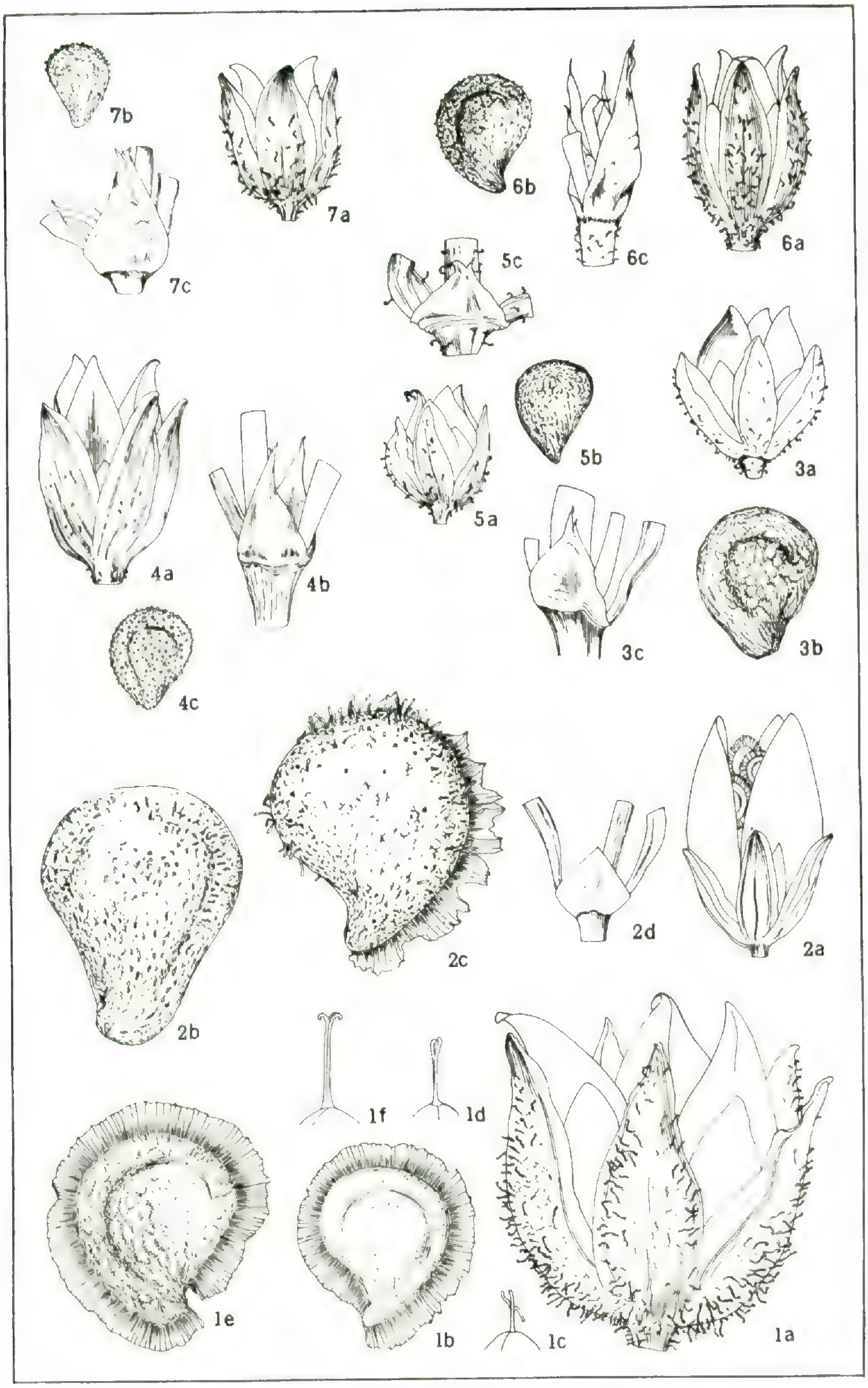

SPERGULARIA: stipule, calyx, capsule and styles × 5; seeds × 25.
S. MACROTHECA, figs. 1a–1c; var. LEUCANTHA, fig. 1d; var. LONGISTYLA, figs. 1e and 1f. S. CANADENSIS, figs. 2a–2d. S. ATROSPERMA, figs. 3a–3c. S. MEXICANA, figs. 4a–4c. S. DIANDRA, figs. 5a–5c. S. RUBRA, figs. 6a–6c. S. BOCCONI, figs. 7a–7c.

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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. CXXXI

SPERGULARIA IN NORTH AND SOUTH AMERICA

Ruth P. Rossbach

(Plates 589–596)

Introduction

The genus *Spergularia* (Pers.) J. & C. Presl[1] in North and South America includes forty species and varieties, five of which are introductions from other parts of the world. The genus reaches the height of its development in Chile where there are fourteen native species. Present collections of these indicate localized geographic distributions which, when studied in conjunction with the geology of the area and ecological conditions, should bring interesting results.

The genus was included in *Arenaria* by Linnaeus, Sp. Pl. (1753 & 1762) and Gen. Pl. ed. 5 (1754). Linnaeus also included one species of the genus under *Alsine*, Gen. Pl. ed. 5, 132 (1754). *Alsine* here included those species which are now known as *Stellaria media* and *Spergularia segetalis;* and *Stellaria media* is designated by the International Rules of Botanical Nomenclature as the type of *Alsine*. The first generic name used solely for the genus under discussion was *Tissa* Adans. Fam. ii. 507 (1763), which is immediately followed by another, *Buda* Adans. l. c., with no significant difference between the extremely cursory, tabular descriptions. In 1769, Mitchell, Princip. Bot. & Zool. App. Gen. Pl. 30, clearly separates the genus from *Arenaria* L.

[1] Fl. Čech. 94 (1819).

as *Corion*, giving a good description. *Corion*, in addition, has a pre-Linnaean basis in Mitchell, Act. Nat. Cur. viii. (1748). In 1805, Persoon, Synop. Pl. i. 504, used *Spergularia* as the name for a section or subgenus under *Arenaria*, and in 1819 J. & C. Presl, Fl. Čech. 94, raised this section to generic rank. *Spergularia* is a *nomen conservandum* according to the Internat. Rules Bot. Nom., revised by Internat. Bot. Congress of Cambridge, 1930, Appendix III, and therefore must be used instead of *Tissa* Adans. or *Buda* Adans, which for very good reasons have become *nomina rejicienda*. Of the many generic synonyms after *Spergularia* (Pers.) J. & C. Presl (1819), *Lepigonum* Wahlb. Fl. Gothob. 45 (1820), with its basis in section *Lepigonum* of *Arenaria* Fries, Fl. Hall. Add. 159 (1817), is the only one which has received extensive use.

No attempt will be made further to discuss the history of the various species of *Spergularia;* one glance at the extent of the synonymy in the following pages will show that a general statement would necessarily be too long and too involved to be of any value. It is sufficient to say that many combinations have been made under the various generic synonyms, many entities described upon superficial characters, such as habit and amount of pubescence, and species already recognized often badly confused. Few students of the genus have noted the variation within one entity, and many have entirely disregarded seeds. Since seeds offer the most important diagnostic character and the general habit is so similar, the confusion of many workers is easily explained.

It should be said, however, that the world monograph of *Lepigonum* by N. C. Kindberg (1863) deserves great praise. He clearly describes entities, giving exact measurements, and reveals careful examination of seeds. The illustrations are accurately and minutely done and, what is more remarkable for that early date, long synoptical treatments and careful citations of herbarium specimens are given. Much of the uncertainty evident in his treatment of American species is due to insufficient material.

In classifying Spergularias careful account, as already stated, should be taken of the seeds, size of mature capsule and its length in relation to sepals, type of inflorescence, size and quality of stipule, and type and degree of fasciculation of leaves. Many other characters serve as subordinate ones, such as number of stamens, length and degree of separation of styles, color of petals, and degree of pubescence.

The seeds of American Spergularias may vary in size from 0.35–1.4 mm. in length, *S. platensis* having the smallest, 0.35–0.4 mm., and *S. canadensis* the largest, 0.9–1.4 mm. The color of seeds varies from very light brown to red-brown, to dark brown, to black. Many species may have an iridescent or a silvery tinge in addition to the color. The surface of the seeds as seen by reflected light under the low power of a compound microscope may be smooth and dull in some species, as in *S. denticulata, S. marina, S. canadensis, S. media, S. macrotheca, S. ramosa, S. rupestris,* etc., or it may be very deeply sculptured in interwoven, vermiform pattern as in *S. rubra, S. atrosperma, S. fasciculata, S. aberrans, S. levis, S. grandis,* etc., or it may sometimes be roughened but in no regular pattern, as in *S. Bocconi, S. platensis, S. pycnantha,* etc. Again, the surface may be highly lustrous, as in *S. stenocarpa* and *S. cremnophila.* There should be an explanation of my use of the term vermiform. This is used to denote closely meandering lines upon the surface, as though a minute worm went back and forth in first this direction, then in that in search of food, leaving his trail behind. I have been unable to find any better term for this type of marking. Sometimes the superficial lines are in crude circles, giving an areolar appearance, and sometimes they are crowded together and deeply cut, making elongate ridges over the surface. Occasionally they are visible merely as very delicate traceries upon a smooth, dull surface, as in *S. villosa* or *S. macrotheca.* The type and presence of papillae are important, and these projections are, for convenience' sake, always considered as separate from the surface in the following treatment. The papillae may be nearly white and glandular to black and rigid and not glandular. They may be crowded upon the surface, giving an encrusted appearance, as in *S. andina, S. platensis* and *S. collina,* or they may be widely and regularly separated, as in *S. ramosa, S. rupestris,* or *S. marina.* Some species may always have papillae, as *S. rubra, S. andina, S. floribunda, S. collina, S. levis, S. pazensis* etc., while others never have papillae, as *S. media, S. macrotheca, S. arbuscula* and *S. denticulata.* There are many species, however, which may or may not have papillae, such as *S. marina, S. canadensis, S. platensis, S. ramosa, S. villosa, S. fasciculata, S. pycnantha* and *S. diandra.* Therefore, if papillae are present, it is important to examine them; if not, to note their absence; for these conditions in conjunction with other characteristics of the seed make it usually possible to identify the species by the seed alone. A characteristic of seeds long used and

often discounted by workers is the presence of a wing. The seeds of many species are never winged, in a few they are always winged, as far as known at present, but in a great many they may or may not be winged. However, if the wing is present, its margin, its color, and its width should be noted. These features may also, in addition to the surface, color, and size, lead one to positive identification.

In addition to seeds, the size of the mature capsules or, in a general way, the length of capsule compared to length of calyx may prove diagnostic. There are a few species in which the capsule is always shorter than the calyx and also a few in which it is always longer. However, there are a great many species in which the capsule may be slightly shorter than, equal to, or slightly longer than the calyx. The last cases show that the length of capsule, as compared to length of calyx, is at best a subordinate character.

In a few species the inflorescence may be short-noded and very crowded, as in *S. arbuscula, S. Cerviana, S. floribunda* and *S. pycnantha.* Other species may be much reduced in inflorescence, *i. e.* with only 1–3 flowers, as *S. andina, S. depauperata* and *S. Pissisi.* Many species may have lax, open, long inflorescences, as *S. grandis, S. pazensis, S. macrotheca, S. villosa* (sometimes), *S. stenocarpa* and *S. levis. S. congestifolia* is unique in having a minute-bracted inflorescence standing sharply differentiated, high above the crowded, leafy parts below. In many species, however, there is nothing striking about the inflorescence, which varies greatly in length of internodes and laxity.

In some species the stipules may be small and roughly deltoid, as in *S. canadensis, S. platensis, S. collina* and *S. ramosa* var. *diffusa.* Other species may have very large (as much as 8 mm. in length), lanceolate-acuminate stipules, as in *S. rupestris, S. levis, S. pazensis, S. ramosa, S. macrotheca, S. aberrans, S. pycnantha* and *S. villosa* (sometimes), although even these may sometimes have smaller stipules of around 5 mm. or less in length. In *S. congestifolia, S. arbuscula,* and usually in *S. fasciculata,* the stipules are strongly lacerate. All the remaining species have medium-sized, non-distinctive stipules which show a great variation in size. Indeed, every species is variable as to stipules to such an extent that their characters must always be considered subordinate.

The leaves of all Spergularias are linear and usually mucronate. In some species they are generally shorter than in others, though

there is usually great variation in length. Some species always have nearly filiform, relatively non-fleshy leaves, as in *S. rubra* and *S. congestifolia;* others have them extremely fleshy, as in *S. arbuscula,* and usually in *S. macrotheca,* while others may have less fleshy leaves, as in *S. fasciculata.* More important than fleshiness is degree of fasciculation, which reaches its height in *S. rubra, S. congestifolia, S. arbuscula, S. fasciculata, S. villosa* and *S. confertiflora.* Other species never have fascicled leaves, such as *S. canadensis, S. platensis* and *S. collina.* There are a great many species, however, in which the leaves are usually not fascicled but are sometimes slightly so.

It is evident from the above discussion that seed-differences are the most useful of diagnostic characters and that combinations of all other characteristics should supplement the study of seeds. However, it must be said that after long study of the many American species, one can become so well acquainted with them that new collections can quickly be sorted out almost without error without microscopic examination. This is due, I suppose, to the combinations of characters peculiar to each species.

Acknowledgments

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Plata); Field Museum (F. M.); Herbarium of the University of Pennsylvania (Penn.); Rijksherbarium, Leiden (Leiden); Pomona College (Pom.); University of California (U. C.); University of Oregon (Ore.); Washington State Museum (W.); National Museum of Canada (Can.); W. A. Newcombe (Newcombe). Also the following herbaria are designated thus: Gray Herbarium (G.); Herbarium of New England Botanical Club (N. E. B. C.); Dudley Herbarium at Stanford University (D. S.); Muséum National d'Histoire Naturelle, Paris (Paris); Museo Nacional de Historia Natural, Santiago, Chile (Santiago); Herbarium, University of Notre Dame (Notre Dame).

Synopsis of Spergularia in North America[1]

a. Plants perennial.....*b.*

b. Seeds 0.7–0.9 mm. long, never papillose: styles 0.6–3 mm. long: sepals 5–10 mm. long: capsule robust. Styles 0.6–1.2 mm. long: petals pink or rosy..................1. *S. macrotheca.*

Styles 1.2–3 mm. long: petals white.

Styles 1.2–1.8 mm. long: capsule as much as 0.5–3 mm. longer than the calyx: seeds dark reddish-brown, always smooth................2. *S. macrotheca,* var. *leucantha.*

Styles 2–3 mm. long: capsule equal to or as much as 1 mm. shorter than the calyx: seeds usually nearly black and ordinarily silvery tinged, commonly deeply sculptured in interwoven, vermiform, areolar pattern......................3. *S. macrotheca,* var. *longistyla.*

b. Seeds 0.4–0.6 (rarely 0.65) mm. long, papillose or not: styles 0.2–0.6 mm. long: sepals 2–5 (rarely 5.2) mm. long: capsule more slender.....*c.*

c. Leaves not fascicled (rarely with one small, leafy branch in the axil), glabrous: root fleshy (fibrous, farinaceous), often 1 cm. thick: styles 0.2–0.4 mm. long: petals 1.2–2.4 mm. long: sepals glabrous or with only sparse, short, glandular pubescence: seeds brown, rounded in outline, sculptured in interwoven vermiform pattern, densely covered with large, glandular papillae which are often cup-shaped, never winged...............4. *S. mexicana.*

c. Leaves densely fascicled, glandular-pubescent: root heavy, ligneous, not farinaceous: styles 0.4–0.6 mm. long: petals 2.6–5 mm. long: sepals densely glandular-pubsecent: seeds very dark brown, nearly black, pyriform, not sculptured, covered with widely spaced, hard, black, non-glandular papillae or not papillose, surrounded by a white, scarious, erose wing or not winged....................................29. *S. villosa.*

a. Plants annuals or short-lived perennials.....*d.*

d. Seeds black.

Seeds 0.6–0.8 mm. long, rounded in outline, often with an iridescent tinge, sculptured in interwoven, areolar vermiform pattern, often deeply so: capsule as much as 0.6–1.4 mm. longer than the calyx: stipules 1.8–2.8 mm. long..................................5. *S. atrosperma.*

[1] Measurements should be made to 0.1 mm. under a hand-lens and seeds should be examined under the low power of a compound microscope.

Seeds 0.4–0.5 mm. long, pyriform, often with a silvery but not iridescent tinge, closely sculptured in interwoven, vermiform, but not areolar pattern: capsule equal to or as much as 0.5 mm. longer than the calyx: stipules 1–2 mm. long. . . . . .6. *S. diandra.*

. Seeds brown. . . . .*e.*

e. Stamens 6–10. . . . .*f.*

f. Seeds smooth, not papillose, usually surrounded by a wing, occasionally not winged, 0.6–1.1 mm., usually 0.8–1 mm. long: capsule large, usually 5.5–7 mm. long: large, robust plants, usually with fleshy leaves. . . . . .11. *S. media.*

f. Seeds roughened or sculptured, always papillose, never winged, 0.4–0.6 mm. long: capsule smaller, 2.8–5.4 mm. long: plants more delicate, usually with less fleshy leaves.

Leaves densely fascicled, filiform, scarcely fleshy: seeds dark brown, deeply sculptured in closely interwoven, vermiform pattern: stipules triangular-acuminate, conspicuous because of the large number of shining ones at a node, usually 3.5–5 mm. long. . . . . .7. *S. rubra.*

Leaves not fascicled or only slightly so, more fleshy: seeds very light brown, surface reticulated or roughened in no regular pattern: stipules deltoid, dull white and scarcely acuminate, 2–4 mm. long. . . . . .8. *S. Bocconi.*

e. Stamens 2–5. . . . .*g.*

g. Seeds large, 0.9–1.4 (very rarely 0.8) mm. long, smooth or with irregular, reticulate thickenings, partially or entirely surrounded by a white, scarious, erose wing or not winged, sometimes with long, delicate, glandular pubescence, especially on the swollen rim at the summit.

Prostrate or decumbent, always entirely glabrous except for the rarely sparsely glandular-pubescent pedicels: sepals always glabrous, blunt-tipped, 2.2–3.2 mm. long: mature capsule once-and-a-half to twice the length of the calyx. . . .9. *S. canadensis.*

Erect or nearly so, glabrous or glandular-pubescent throughout: sepals not blunt-tipped, 3–4.6 mm. long: mature capsule less than one-and-a-half times the length of the calyx. . 10. *S. canadensis*, var. *occidentalis.*

g. Seeds 0.35–0.8 (very rarely 0.9) mm. long. . . . .*h.*

h. Seeds 0.35–0.4 mm. long: infloresence a much compounded cyme, glabrous throughout: sepals 0.8–1.6 mm. long: mature capsule 1.4–2.6 mm. long. . . . . .33. *S. platensis.*

h. Seeds 0.5–0.8 (rarely 0.9) mm. long, glandular-papillose or not: inflorescence a lax, simple or only 1–2-times compounded cyme, sometimes glabrous but usually glandular-pubescent: sepals 1.6–5 mm. long: mature capsule 3–6.4 mm. long.

Seeds silver-tinged, always roughened and often sculptured in irregular, vermiform pattern with irregular, short ridges between the sculptures: stipules shorter than broad, 1.4–2.4 mm. long: styles 0.3–0.4 mm. long. . . . . .14. *S. echinosperma.*

Seeds dull, smooth or occasionally only slightly roughened by raised thickened areas: stipules as long as or longer than broad, 2–4 mm., usually 2.5–3 mm. long: styles 0.4–0.6 mm. long.
Inflorescence a lax cyme, not crowded: sepals 2.4–5 mm. long: mature capsule 3.6–6.4 mm. long.................................12. *S. marina.*
Inflorescence crowded, with many flowers: stems highly branched: sepals usually shorter, 1.6–3.8 mm. long: mature capsule usually shorter, 3–4.4 mm. long..............13. *S. marina*, var. *tenuis.*

Synopsis of Spergularia in South America[1]

a. Stipules deeply lacerate, *i. e.* for one-third their length or more.....*b.*

b. Inflorescence with much longer internodes than those of the stem, the inflorescence thus standing sharply differentiated high above the leafy lower parts: leaves short, filiform, falcate, densely fascicled: stipules lacerate for nearly two-thirds their length, giving the plant a silky appearance: fruiting pedicels long, the lowest 10–23 mm.: seeds unknown..............................15. *S. congestifolia*

b. Inflorescence with internodes not longer than those of stem, not sharply differentiated from the leafy parts below: leaves not falcate, filiform to very fleshy: stipules lacerate for one-half their length or less: fruiting pedicels usually shorter, often very short: seeds dark brown or black.

Small shrub: inflorescence a compact cyme with crowded internodes: sepals glabrous or slightly glandular-pubescent at the base, 2.4–5 mm. long: petals 1.8–4 mm. long: styles 0.8–1.2 mm. long, separated to the base: mature capsule 1.6–3.6 mm. long: fruiting pedicels very short, the lowest 1–3 mm. long: seeds 0.6–0.8 mm. long, shining but never silvery, never winged..16. *S. arbuscula.*

Perennial but not a shrub, *i. e.* herbaceous above the caudex: inflorescence a short, open cyme: sepals always glandular-pubescent, 5–10 mm. long: petals 4–10 mm. long: styles 1.5–2.5 mm. long, separating only partially, at the most 0.6 mm. from the apex: mature capsule 5–7 mm. long: fruiting pedicels 6–17 mm. long: seeds 0.8–1 mm. long, often with a silvery tinge, surrounded by a narrow, scarious wing or not winged....................................17. *S. fasciculata.*

a. Stipules very shortly or not at all lacerate at the apex.....*c.*

c. Inflorescence with only 1–3 (rarely 4) flowers: plants with short internodes, usually forming low, thick mats.....*d.*

d. Sepals hooded at the apex: mature capsule 3–4 mm. long, exceeded by the calyx by as much as 0.5–1.2 mm.: fruiting pedicels very short, 0.5–2.5 mm. long: seeds brown, deeply sculptured and covered with large, glandular papillae which give them an encrusted appearance, 0.6–0.8 mm. long, not winged..........18. *S. andina.*

d. Sepals blunt, not hooded, usually very fleshy: mature capsule 4.8–5.5 mm. long, equal to or but slightly exceeding the calyx, by as much as 0.5 mm.: fruiting

[1] Measurements should be made to 0.1 mm. with a hand-lens and seeds should be examined under the low power of a compound microscope.

pedicels 3–15 mm. long: seeds only delicately sculptured, 0.8–1 mm. long, always surrounded by a scarious wing.
Seeds light brown, surrounded by a broad wing so deeply lacerate as to form strap-like appendages 0.3–0.6 mm. long, covered with regularly spaced, glandular hairs branched at the tips: internodes of stem below the inflorescence without corky appearance: leaves filiform, not fleshy, usually 7–13 mm. long, 0.5 mm. broad: fruiting pedicels 6–15 mm. long.....................................19. *S. depauperata.*
Seeds dark brown, with a narrow, entire-margined wing 0.1 mm. wide, not papillose: internodes of stem below the inflorescence soft, with corky appearance: leaves linear, fleshy, 2–7 mm. long, 0.8–1 mm. broad: fruiting pedicels 3–5 mm. long.....20. *S. Pissisi.*
c. Inflorescence more than 3–4-flowered: plants lax and spreading, not forming thick mats.....*e.*
e. Seeds with broad, scarious wings 0.3–0.7 mm. wide and with nearly entire margins.....*f.*
f. Seeds light brown, not sculptured, smooth or covered with widely and regularly spaced brown papillae.
Central root not fleshy and starchy: styles 1–1.4 mm. long: leaves not spreading: stipules at least twice as long as broad, usually 3–5 mm. long: mature capsule equal to or slightly exceeding the calyx.....................................35. *S. ramosa.*
Central root fleshy and starchy, with a smooth, corky bark: styles 0.7–0.8 mm. long: leaves often spreading, giving a pseudoverticillate appearance: stipules usually shorter, almost deltoid, commonly 1.2–3 mm. long: mature capsule at least one-third longer than the calyx..36. *S. ramosa*, var. *diffusa.*
f. Seeds dark, reddish brown or black, sculptured or not, papillose or not.
Seeds sculptured and with or without dark papillae.
Capsule 4–5-valved: styles 4–5: stems robust, 2–2.5 mm. in diameter.....................38. *S. grandis.*
Capsule 3-valved: styles 3: stems 0.8–1.5 mm. in diameter.............................39. *S. pazensis.*
Seeds not sculptured but smooth or with low, elongate mounds, never papillose..............11. *S. media.*
e. Seeds with wings less than 0.3 mm. wide or if so broad with erose margins, or not winged.....*g.*
g. Seeds brown, highly lustrous, smooth or only slightly sculptured.
Mature capsule slender, 3.2–4.8 mm. long: stamens 5: seeds 0.4–0.7 mm. long, not winged but sometimes with an extremely narrow, brown rim.23. *S. stenocarpa.*
Mature capsule robust, 5–6.6 mm. long: stamens 8–10: seeds 0.7–1.2 mm. long, surrounded by a hard, narrow, brown rim.................21. *S. cremnophila.*
g. Seeds not lustrous, smooth or deeply sculptured.....*h.*
h. Sepals mucronate: plant annual: seeds brown, smooth, dull, 0.5–0.6 mm. long.............24. *S. denticulata.*
h. Sepals not mucronate.....*i.*
i. Seeds black or dark brown, deeply sculptured in interwoven, vermiform pattern, 0.8–1 mm. long.....*j.*

j. Stamens 5: seeds dark, sepia-brown, surrounded by a narrow, brown, sculptured wing....22. *S. aberrans.*
j. Stamens 7–10.....*k.*
k. Inflorescence a crowded, compound, many-flowered cyme, glabrous or only very sparsely pubescent: sepals glabrous, 2.6–4.5 mm. long: seeds covered with large, glandular papillae....................25. *S. Cerviana.*
k. Inflorescence an open, often lax cyme, densely glandular-pubescent: sepals densely glandular-pubescent, 5–10 mm. long.
Inflorescence a short, open cyme, not lax: styles united for more than one-half their length: leaves densely fascicled, usually filiform...................17. *S. fasciculata.*
Inflorescence a lax cyme: styles divided to the base or united only rarely for as much as one-half their length: leaves usually not so densely fascicled.
Seeds brown, dull, with only occasional, small papillae: mature capsule 5–6.6 mm. long, equal to or as much as 2.4 mm. shorter than the calyx: leaves fleshy, 1–3 mm. wide..........21. *S. cremnophila.*
Seeds very dark brown or black, glistening, nearly always covered with many, large, dark papillae: mature capsule usually much larger, 6.2–8.4 mm. long, equal to or up to 2 mm. longer than the calyx: leaves only 0.4–1 mm. wide...........................39. *S. pazensis.*
i. Seeds light brown, or if dark brown or black less than 0.8 mm. long, or if 0.8–1 mm. long not sculptured and either light or dark brown.....*l.*
l. Sepals very short, 0.8–1.6 mm. long: plant glabrous throughout, very slender, with a much compounded cyme: seeds 0.35–0.4 mm. long, sculptured and usually papillose.33. *S. platensis.*
l. Sepals longer, 2.2 mm. or more long.....*m.*
m. Capsule spherical: seeds black, densely covered with papillae, 0.4–0.7 mm. long, not winged........................26. *S. floribunda.*
m. Capsule not spherical....*n.*
n. Seeds winged.....*o.*
o. Seeds deeply sculptured in interwoven, vermiform pattern.
Plant glabrous throughout: internodes 28–50 mm. long: leaves long, 22–80 mm.: capsule usually 6–8 mm. long, as much as 1.6–3.4 mm. longer than the calyx: fruiting pedicels glabrous, the lowest 7–20 mm. long: seeds deep reddish-brown, glandular-papillose, surrounded by a scarious, white, strongly erose wing............................37. *S. levis.*
Plant glandular-pubescent at least in the inflorescence: internodes 6–20 mm. long: leaves 15–20 mm. long:

capsule 5–5.2 mm. long, equaling or up to 1 mm. longer than the calyx: fruiting pedicels glandular-pubescent, the lowest 5–7 mm. long: mature seeds unknown . . . . 32. *S. colombiana.*

o. Seeds not sculptured.

Stamens 2–5 . . . . 12. *S. marina.*

Stamens 7–10.

Seeds 0.4–0.6 (rarely 0.65) mm. long, pyriform, very dark brown or nearly black. . . . . 29. *S. villosa.*

Seeds 0.7–1.1 mm. (very rarely 0.6 mm.) long, rounded in outline, light brown to dark brown.

Seeds light brown, covered with brown papillae, 0.7–0.8 mm. long: mature capsule equal to or as much as 0.8 mm. shorter than the calyx: sepals densely glandular-pubescent: styles 1–1.2 mm. long . . . . 40. *S. rupestris.*

Seeds dark brown, not papillose, 0.7–1.1 (rarely 0.6) mm. long: mature capsule usually 1–2.5 mm. longer than the calyx, rarely equaling it: sepals glabrous or only sparsely glandular-pubescent: styles 0.5–1 mm. long. . . . . 11. *S. media.*

n. Seeds not winged. . . . *p.*

p. Stamens 6–10. . . . . *q.*

q. Annual or sometimes a short-lived perennial. . . . . *r.*

r. Seeds not sculptured but smooth or with low, elongate mounds, 0.7–1.1 (rarely 0.6) mm. long. . . . . 11. *S. media.*

r. Seeds sculptured or irregularly roughened and papillose, 0.4–0.8 mm. long.

Seeds black, covered with long, large, black, glandular papillae: inflorescence widely angled: styles 0.8–1 mm. long. . . . . 30. *S. collina.*

Seeds brown, with minute, small, brown papillae: inflorescence crowded or lax but not widely angled: styles 0.4–0.8 mm. long.

Leaves densely fascicled: stipules lanceolate-acuminate, shining, conspicuous because of their great number at an internode: styles 0.6–0.8 mm. long: seeds dark brown, not silvery, deeply sculptured in closely interwoven, vermiform pattern. . . . 7. *S. rubra.*

Leaves not fascicled or with only 1–2 minute leaves at the

axil: stipules deltoid or nearly so, dull, inconspicuous: styles 0.4–0.6 mm. long: seeds light brown, often silver-tinged, surface reticulated and roughened but in no regular pattern.........8. *S. Bocconi.*

q. Perennials.....*s.*

s. Sepals glabrous but sometimes glandular-punctate.

Seeds light brown, not papillose, but often with minute, elongate ridges, 0.5–0.6 mm. long: sepals recurved but incurved at the apex, often hooded, usually minutely glandular-punctate, especially on the upper parts: inflorescence a lax cyme....31. *S. Spruceana.*

Seeds dark brown, covered with glandular papillae, 0.6–0.8 mm. long: sepals not recurved, nor hooded, nor glandular-punctate: inflorescence a compound cyme, usually crowded because of many capsules and short internodes.....................25. *S. Cerviana.*

s. Sepals glandular-pubescent.

Capsule longer than the calyx: seeds dark brown, nearly black, pyriform, not sculptured but with regularly spaced, black papillae or not papillose, and with very delicate, vermiform traceries in areolar pattern, 0.4–0.6 (rarely 0.65) mm. long. 29. *S. villosa.*

Capsule equal to or as much as 0.8 mm. shorter than the calyx: seeds brown, rounded in outline, sculptured in interwoven, vermiform pattern, with large, elongate, slightly curved papillae (some seeds having in addition some round papillae), 0.6–0.7 mm. long.........28. *S. confertiflora.*

p. Stamens 2–5.

Annual: the non-sculptured seeds covered with glandular papillae or not papillose, 0.6–0.8 mm. long. 12. *S. marina.*

Perennial: the sculptured seeds papillose or not, 0.3–0.5 mm. long.

Whole plant glabrous: sepals 2.2–2.8 mm. long: capsule as much as 1–1.2 mm. longer than the calyx: stipules deltoid, 1.2–1.6 mm. long: cyme simple, not crowded. 34. *S. platensis*, var. *Balansae.*

Whole plant densely glandular-pubescent: sepals 3.6–4.6 mm. long: capsule equal to or as much

as 0.8 mm. shorter than the calyx: stipules lanceolate-acuminate, 5–7 mm. long: cyme compound and usually crowded by many capsules and short upper internodes.
27. *S. pycnantha.*

1. S. macrotheca (Hornem.) Heynh. (Plate 589, figs. 1a–1c and map 1). Perennial: *caudex* branched, becoming woody with age, bearing from 1– ∞ prostrate or semi-erect stems 3–45 cm. long; *internodes of stem below the inflorescence* glabrous or glandular-pubescent, 2–50 mm. long, 0.8–3 mm. in diameter: *leaves* fascicled or not, mucronate, fleshy, 0.6–3 mm. broad, 7–50 mm. long, glabrous to densely glandular-pubescent; *stipules conspicuous, triangular-acuminate,* 4–11 mm., usually 6–9 mm. long: *inflorescence* always glandular-pubescent throughout, lax with long internodes or crowded with short internodes but with the internodes becoming shorter toward the apex, the *lowest internodes* 3–35 mm. long, 0.8–1.4 mm. broad: *sepals* broadly lanceolate, *often attenuate,* glandular-pubescent, 5–10 mm., usually 6–9 mm. long; *petals* ovate, *rosy to light pink* and perhaps occasionally white,[1] 3.5–8, usually 4–6 mm. long, as much as 0.4–4 mm. shorter than calyx; *stamens* 10; *styles* 3, 0.6–1.2 mm. long, separated to base: *mature capsules* 5.5–10, usually 6–8 mm. long, 2 mm. shorter to 2 mm. longer than calyx: *fruiting pedicels* reflexed or not, the lowest 5–35 mm. long, 0.2–1, usually 0.6–0.8 mm. thick: *seeds dark, reddish-brown, dull, nearly smooth* or slightly hubbled with low, rounded mounds, usually not sculptured or with only scarcely discernible vermiform, areolar traceries or occasionally very obvious channels upon the surface, 0.6–1 mm., usually 0.7–0.9 mm. long, *usually surrounded by a narrow, scarious, white or brownish, entire wing* 0.2 mm. or less wide, *or by a still narrower, opaque, brown rim,* occasionally not winged.—Heynh. Nom. ii. 689 (1846); Robins. in Proc. Am. Acad. xxix. 312 (1894); Robins. in Gray, Synop. Fl. N. Am. i. 252 (1897); Jepson, Fl. Calif. 493 (1914); Jepson, Man. Fl. Pl. Calif. 360 (1923); Munz, Fl. S. Calif. 164 (1935); Macbride, Field Mus. Nat. Hist. Pub. Bot. xiii.—Fl. Peru, pt. ii. no. 2. 631 (1937), perhaps as to description but the species not known from Chile and Peru. *Arenaria macrotheca* Hornem. ex Cham. & Schlecht. in Linnaea, i. 53 (1826). *Lepigonum macrothecum* Fisch. & Mey. Ind. Sem. Hort. Petrop. iii. 14 (1837), *nomen nudum;* Kindb. Synop. Lepig. 14 (1856). *Lepigonum macrothecum* (Hornem.) Kindb. Mon. Lepig. 16, t. i. fig. i. (1861); Wats. Bibl. Index (Smithson. Misc. Coll. 258), 103 (1878); Brewer & Watson in Geol. Survey of California, Botany, i. 71 (1876). *Spergularia rubra* sensu Torrey, Pacific R. R. Report, Botany, iv. 70 (1857), in part (Corte Madera coll. includes 2 plants, *S. macrotheca* and *S. media;* Martinez collection not found), non *Arenaria rubra* L. (1753); sensu

[1] I have never seen any absolutely white in the field but some labels state distinctly that the flowers are white. It is possible that the very light pink tinge was not noticed.

Torrey, Wilkes Explor. Exped. xvii., Botany, 247 (1874), in part at least (including the Lower Sacramento coll. the Puget Sound coll. not found), non *Arenaria rubra* L. (1753). *Tissa pallida* Greene ex Britton in Bull. Torr. Bot. Club, xvi. 126 (1889) (Monterey, *Meehan* coll. not seen); Greene, Man. Bot. San Francisc. Bay, 36 (1894). *Tissa macrotheca* (Hornem.) Britt. in Bull. Torr. Bot. Club, xvi. 129 (May 8, 1889); Brandeg. in Proc. Calif. Acad., Ser. 2, ii. 131 (Nov. 12, 1889), probably, though Socorro, Lower Calif. coll. not seen; Greene, Man. Bot. San Francisc. Bay, 35 (1894); Jepson, Fl. W. Mid. Calif. 169 (1901); Howell, Fl. Northwest Coast, 88 (1903); Piper, Contrib. U. S. Nat. Herb. xi. (Fl. State Wash.), 263 (1906); Piper and Beattie, Fl. Northwest Coast, 145 (1915). *Tissa macrotheca* var. *scariosa* Britt. in Bull. Torr. Bot. Club, xvi. 129 (1889); Jepson, Fl. W. Mid. Calif. 170 (1901). *Buda macrotheca* (Hornem.) Kuntze, Rev. Gen. 50 (1891). *Tissa Talinum* Greene in Erythea, i. 106 (1893). *Tissa valida* Greene in Erythea, i. 107 (1893). *Spergularia macrotheca* var. *scariosa* (Britt.) Robins. in Proc. Am. Acad. xxix. 313 (1894) and Synop. Fl. i. 253 (1897); Jepson, Fl. Calif. 493 (1914) and Man. Fl. Pl. Calif. 360 (1923). *Spergularia macrotheca* var. *Talinum* (Greene) Jepson, Fl. Calif. 493 (1914) and Man. Fl. Pl. Calif. 360 (1923); Munz, Fl. S. Calif. 164 (1935). *Alsine valida* (Greene) House in Am. Midl. Nat. vii. 134 (1921). *Alsine macrotheca* (Hornem). House, l. c. *Alsine Greenei* House, l. c., renaming of *Tissa pallida* Greene.—NORTH AMERICA: along the Pacific Coast from northern Baja California to Vancouver Island, British Columbia. BAJA CALIFORNIA: San Quentin, *E. Palmer* 732, February, 1889 (U. S., G.); 23 miles south of Hamilton's Ranch, Santa Maria Plains, *Wiggins* 4537, March 23, 1930 (D. S.); Ensenada, *M. E. Jones*, April 11, 1882 (Pom.). Guadalupe Island, *E. Palmer* 864, March 29, 1889 (U. S., G., U. C., very thick, short, fleshy leaves); *E. Palmer* 864a, March 29, 1889 (U. S., Notre Dame, U. C., type collection of *Tissa Talinum* Greene, with short, glabrous, linear leaves); *Rose* 16027, March 2, 1911 (U. S., G., with glabrous linear leaves). CALIFORNIA: San Diego Co.: Oceanside, *S. B. Parish* 4451, June 11–16, 1897 (G., U. S.); sand dune strand, La Jolla, *F. E. & E. S. Clements*, March 14, 1914 (G.); sandy ocean beach, La Jolla, *L. F. Henderson* 13404, Jan. 31, 1931 (Ore.). Riverside Co.: alkaline marsh, Wildomar, *I. M. Johnston* 1872, April 27, 1918 (U. S., Pom.);[1] between Murietta and Temecula, *Munz* 2136, April 27, 1918 (Pom.).[1] Orange Co.: Newport Bay, *Lawrence M. Booth* 1062, May 19, 1932 (U. C., Pom.). Los Angeles Co.: moist ground of drying winter pool, mesa at north end of Baldwin Hills, Culver City, *Ewan* 7438, April 30, 1932 (U. C.); Ballona Harbor, *Abrams* 1223, April 1, 1901 (D. S., Pom.); east side of San Clemente Island, overhanging cliffs near the beach, *Nell Murbarger* 65, March, 1936 (U. C., with long lax stems and open inflorescence characteristic of *S. macrotheca*); sand dune, northwest coast, San Clemente Island, *Munz* 6608, April

[1] Even though on the coast, this collection has pink flowers and short styles.

8, 1923 (Pom., U. C., G., large fleshy plants with many-flowered, open inflorescence, seeds 0.6–0.7 mm. long); San Clemente Island, *M. E. Jones*, September 9, 1926 (Pom., inflorescence dense, erect habit approaching *Palmer* 864 from Guadalupe Island, seeds 0.6–0.9 mm. long); San Clemente Island, *Brandegee*, August 25, 1894 (U. C., 2 sheets, heavy, fleshy plants, one with inflorescence sharply differentiated and the other not, seeds 0.8 mm. long, habit approaching Guadalupe Island plants, such as *Palmer* 864a and 864); low ground near beach, Little Harbor, Santa Catalina Island, *M. B. Dunkle* 1910, April 29, 1928 (Pom.); seaside, Avalon, Santa Catalina Island, *Blanche Trask*, May, 1896 (U. S.); back beach flat, Emerald Bay, Santa Catalina Island, *M. B. Dunkle* 1815, April 9, 1928 (Pom.). Ventura Co.: frequent along seashore, San Nicolas Island, *Blanche Trask* 25, April, 1901 (G.); Santa Barbara Island, *Abrams & Wiggins* 312, July 3, 1931 (U. C., Cal. Acad., D. S.); on dry clay flat, Anacapa Island, *John T. Howell* 3803, May 19, 1928 (Cal. Acad.); along beach, Ventura, *Alice Eastwood* 5026, April 17, 1916 (Cal. Acad.). Santa Barbara Co.: sand dunes adjacent to Santa Barbara, *Eastwood*, May 30, 1909 (Cal. Acad.); deep sand of ravines between high dunes, Surf, *Grant, Ballon, & Ewan* 7921, May 30, 1933 (Pom.); Santa Cruz Island, *Greene*, July and August, 1886 (U. C., D. S.), type coll. of *Tissa valida* Greene; heavy soil in grassy places near ranch, Santa Rosa Island, *Munz & Crow* 11747, April 9, 1930 (Pom.); San Miguel Island, *Ralph Hoffmann*, June 11, 1930 (Cal. Acad.). San Luis Obispo Co.: roadside, Cayucos, *I. J. Condit*, June 14, 1911 (U. C.); along Morro Bay, *Eastwood* 18874, April 19, 1935 (Cal. Acad.); Roosevelt Highway n. of San Simeon, *Ynez Whilton Winblod*, June 17, 1937 (Cal. Acad.). Monterey Co.: Point Sur, *R. S. Ferris* 3701, April 22, 1923 (D. S.); Point Lobos, *Greene*, July 1, 1891 (U. S., W., D. S.); on maritime rocks, Cypress Point, Monterey, *A. Gray*, February–May, 1885 (G.,[1] low plants with short internodes); Pacific Grove, *Tidestrom*, June 6, 1893 (G., U. C., D. S., Pom.); Pacific Grove, *Elmer* 4387, June, 1903 (U. S., U. C., Pom., D. S., Ore.); Pacific Grove, *Gwendolyn Newell*, July 8, 1914 (G., Cal. Acad., seeds small, 0.6–0.7 mm. long, plants very lax and with long internodes); coast of Monterey, *J. D. Hooker and A. Gray*, Hayden's Survey of U. S. Territories, 1877 (G.,[1] lower internodes short but inflorescence open and high above). Santa Cruz Co.: ocean bluffs, Santa Cruz, *Lewis S. Rose* 35221, June 16, 1935 (Cal. Acad.). Santa Clara Co.: San Jose, *Mrs. E. A. Bush*, 1880 (U. S.). San Mateo Co.: in muddy clay at bottom of a small gully in high sea cliffs, 3 miles south of Half Moon Bay, *G. B. & R. P. Rossbach* 608, November 25, 1937 (G., D. S.,[2] lax, long-

[1] Cited under *Tissa macrotheca* var. *scariosa* by Britt. in Bull. Torr. Bot. Club, xvi. 129 (1889).

[2] These three collections were made at the same time within a few feet of each other and show characteristic plants of *S. macrotheca* and of var. *scariosa* (Britt.) Robins. with transition stages. It may be seen that sheltered plants grow lax and longer-leaved, while plants in exposed places become compressed mats with shorter

stemmed plants); forming hanging mats and cushions in soft sandy soil, face of sea cliffs, same locality, *G. B. & R. P. Rossbach* 609, November 25, 1937 (G., D. S.);[1] on top of sea cliffs of crumbling rock and sandy soil, same locality, *G. B. & R. P. Rossbach* 610, November 25, 1937 (G., D. S.,[1] part of the plants with *very* short internodes, making plants small and congested); Belmont, *Burtt Davy* 809, April 17, 1893 (U. C.); mats on cliffs along coast, Montara Point, *Copeland* 3317, June 5, 1903 (U. S., G., Pom., U. C., determined as *Tissa pallida* by E. L. Greene). San Francisco Co.: bluffs near the sea, back of Lake Merced, *Greene*, June 9, 1887 (U. C., D. S., type collection of *Tissa pallida* Greene); saline soils, South San Francisco, *Stewart H. Burnham* 931, April 21, 1895 (Pom., both a long- and a short-internoded plant, the latter similar in habit to Guadalupe and San Clemente plants); Presidio, San Francisco, *Heller* 5700, June 12, 1902 (G., Pom., D. S., U. S.); near San Francisco, *J. Torrey* 41, 1865 (G., type collection of *Tissa macrotheca* var. *scariosa* Britt., with very short internodes); San Francisco, *K. Brandegee* June, 1890 (G., both short-internoded compressed and long-internoded lax plants in same collection); Farallone Island, *L. M. Loomis*, July, 1896 (U. C.). Contra Costa Co.: Point Richmond, *H. M. Hall* 1664, March 16, 1921 (U. C.). Alameda Co.: near Newark, *Burtt Davy* 1110, May 6, 1895 (U. C., G.); Mt. Eden, *K. Brandegee*, May 14, 1893 (G., U. C.; Gray spec. marked *S. macrotheca* var. *leucantha*, a form with roseate petals, by B. L. Robinson for Syn. Fl. N. Amer.). Napa Co.: Napa River levee at Cuttings Wharf, *J. T. Howell* 10803, October 8, 1932 (Cal. Acad.). Marin Co.: Corte Madera, *J. M. Bigelow*, 1853–4 (G., U. S.,[2] only part of the collection, the other plant being *Spergularia media* (L.) C. Presl); along roadside at edge of salt marsh at Stinson Beach, *G. B. & R. P. Rossbach* 606, May 26, 1938 (G., D. S., U. C., U. S.); Point Reyes, *Burtt Davy* 6773, June 18, 1900 (U. C., showing both lax, long-stemmed and matted, short-stemmed plants). Sonoma Co.: Bodega Point, *Eastwood* 4796, June 29, 1915 (U. S., G.); Bodega, *Katherine Brandegee*, June, 1905 (U. C.). Mendocino Co.: Mendocino, *H. E. Brown* 878, August, 1898 (G., U. S., a large cushion-forming plant with short internodes); Mendocino, *Jos. McMurphy* 39, July, 1903, (U. S., D. S., with long internodes). Humboldt Co.: plentiful in a salt flat between Eureka and Arcata, *Heller* 13780, July 9, 1923 (U. S., D. S.); Arcata, *M. E. Jones* 28873, July 16, 1931 (U. C., Pom.); salt marshes, Eureka,

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leaves. This is true anywhere on the coast with similar variable habitats and therefore makes var. *scariosa* (Britt.) Robins. untenable.

[1] These three collections were made at the same time within a few feet of each other and show characteristic plants of *S. macrotheca* and of var. *scariosa* (Britt.) Robins. with transition stages. It may be seen that sheltered plants grow lax and longer-leaved, while plants in exposed places become compressed mats with shorter leaves. This is true anywhere on the coast with similar variable habitats and therefore makes var. *scariosa* (Britt.) Robins. untenable.

[2] Cited under *Spergularia rubra* by Torrey, Pacific R. R. Report., Botany iv. 70 (1857).

Eastwood & Howell 3782, July 3, 1936 (Cal. Acad., G.). Del Norte Co.: Castle Island, near Crescent City, *Mrs. G. Earle Kelly*, June, 1924 (Cal. Acad.). California without definite locality: Lower Sacramento, *Wilkes' Explor. Exped.* (U. S.);[1] from sands in California, but collected from Berlin Bot. Gard., *Schlechtendal*, 1825 (B. TYPE, fragment G., photo. of fragment D. S.).[2] OREGON: Curry Co.: tide-lands, mouth of Chetco River, *Henderson* 9988, June 4, 1929 (Ore., U. C.). Coös Co.: banks and thickets, Marshfield, *H. D. House* 4989, September 1, 1912 (U. S.). Lane Co.: salt marshes, Florence, *Henderson* 16506, August 7, 1934 (Ore.). Lincoln Co.: beach, Seal Rock, 10 mi. s. of Newport, *M. E. Peck* 7269, September 5, 1917 (G.); Yachats, *Sweetser*, August 30, 1909 (Ore.); moist cliffs along the coast, Yaquina Bay, *Henderson*, July 12, 1881 (Ore., seeds small, around 0.6 mm. long, but plant lax and long-internoded, characteristic of the species). Tillamook Co.: tide-flats of Tillamook Bay, Bay Ocean, *Henderson* 11549, July 31, 1929 (Ore.); salt marshes, Tillamook, *T. Howell*, July, 1882 (Ore.). WASHINGTON: Pacific Co.: in marsh, tide-flat, North Cove, *A. S. Forster* 826, July 26, 1908 (U. S.). Clallam Co.: high beach, mouth of Quillayute River, *I. C. Otis* 1557, July 31, 1927 (W.); moist ground on sandspit at Port Angeles, *J. W. Thompson* 7852, August 10, 1931 (U. S., G., D. S., seeds 0.6–0.7 mm. long). San Juan Co.: Argyle, San Juan Island, *S. M. & E. B. Zeller* 937, June 25–August 1, 1917 (U. S.); Kanaka Bay, San Juan Island, *Lucile Roush*, June 29, 1919 (D. S.). BRITISH COLUMBIA: vicinity of Victoria, Vancouver Island, *John Macoun* 12, August 13, 1893 (U. S.); Victoria, *John Macoun* 2781, June 18, 1887 (U. S.); rock-crevices, Gonzales Point, Victoria, *C. F. Newcombe*, July 21, 1919 (D. S., Newcombe); Java Rocks, Haro Strait, *W. A. Newcombe*, May 7, 1934 (D. S., Newcombe).

The habit of *S. macrotheca* varies from robust, long-noded, many-stemmed plants growing in rich, alkaline mud, to sprawling, slender, few-flowered ones inhibited by the crowding of other plants, or to short-stemmed, matted plants with crowded internodes, growing on cliffs exposed to sea-winds. This latter phase has been called var. *scariosa* by Britton and others, because of short internodes and heavy, glandular pubescence. More valuable diagnostic characters, such as

[1] Cited under *Spergularia rubra* by J. Torrey, Wilkes. Explor. Exped. xvii., Botany, 247 (1874).

[2] Cham. & Schlecht. in Linnaea, i. 53 (1826), published a previously inedited, botanical garden name of Hornemann for a plant growing in the Berlin Botanical Garden from seeds collected in sands of California by *Chamisso*. The plant in the Berlin Herbarium, a fragment of which is cited above, as in the Gray Herbarium, may then be taken as the type for *Arenaria macrotheca* Hornem., even though there should be a specimen at Leningrad where the chief collection of *Chamisso* is to be found (there is none in the first duplicate set in Berlin), the botanical garden plant would be the type because it was from that that the species was described.

seeds, stipules, flower- and fruit-measurements, all are the same as in more characteristic robust specimens of the species. In collecting almost anywhere on the cliffy shores of California, all stages in length of internode, size of plant and degree of pubescence may be found within a few feet of each other, one always finding that the scrubbiest plants grow in the most exposed places. Examples of this may be seen among the many collections from the Monterey peninsula, in collections made by the author at Half Moon Bay, San Mateo Co. (see note under citations), in the *Copeland* collection from Montara Point, San Mateo Co., among the many collections from San Francisco, and in the collection of *J. Burtt Davy* from Point Reyes, Marin Co. In addition, this compressed plant has no geographic range separate from that of the species.

Tissa pallida Greene was described: "plant stout, very light colored" and it grew on "bluffs near the sea, back of Lake Merced" near San Francisco. The plant has capsules fully mature, so perhaps it was past its prime and losing some of its fresh green color. The plant is also far from stout for this species but like the common form on the moist sea-bluffs where it hangs in dense mats. Therefore, since all the diagnostic measurements are the same as those of *S. macrotheca,* there is nothing to distinguish this plant from the species.

The type of *Tissa valida* Greene from Santa Cruz Island is a robust, glandular, heavily fruiting plant very characteristic of the common run of plants throughout the coast. There are no diagnostic characters making it different from the rest.

At first there seems reason for keeping *Tissa Talinum* Greene from Guadalupe Island, Mexico, as an entity because of its extremely short-internoded habit and crowded, spreading, fleshy leaves, with a leafless, strict inflorescence standing definitely above the foliage. Even though some of the Guadalupe Island plants have no match in habit anywhere else, there are plants there which do have some bracts in the inflorescence (*Howell* 8329) and do not have a strict inflorescence standing high above the foliage (*Palmer* 864). The leaves are very variable, being linear-filiform, nearly glabrous, 2–5 cm. long and 1 mm. wide, as often as very fleshy, densely glandular-pubescent, 1–2 cm. long and 3 mm. wide, with all stages between. One can scarcely use leaves as a diagnostic character. Guadalupe Island plants are always suffrutescent but so is the species often, throughout its range. This habit may be due to the drastic, desert

conditions upon the island. The seeds of Guadalupe plants measure 0.5–0.7 mm. long. Although the seeds of *S. macrotheca* are usually 0.7–0.9 mm., they are occasionally 0.6 mm. long, as in the following collections: *Munz* 6608, San Clemente Island; *Newell*, Pacific Grove; *Thompson* 7852, Port Angeles, Washington. All of these collections are plants with long internodes and characteristic habit of the larger specimens of the species, and do not suggest the habit of any of the Guadalupe Island plants. It is significant that the collection of *Marcus E. Jones* from San Clemente Island, 1926, which has a habit somewhat suggesting *T. Talinum* in its spreading, densely fascicled leaves and erect, crowded inflorescence, has seeds all the way from 0.6 to 0.9 mm. in length. The collections of *T. S. Brandegee*, 1894, from San Clemente Island approach in habit the Guadalupe Island plants of *Palmer* but have seeds about 0.8 mm. long. The measurements of stipules and styles and the number of stamens are the same as in *S. macrotheca*, while measurements of capsule and sepals are included within the range of variation of, although smaller than the average of the species. All these facts, showing that *Tissa Talinum* is not consistently distinct in any character, make its taxonomic standing very weak.

2. Var. LEUCANTHA (Greene) Robinson (PLATE 589, FIG. 1d and MAP 2). *Sepals* ovate-lanceolate, *never attenuate*, 4.5–7 mm., usually 5–6 mm. long; *petals white* or rarely pink-tinged,[1] 4.5–7 mm., usually 5–6 mm. long, usually equal to or sometimes as much as 1 mm. longer than or shorter than the calyx; *styles 1.2–1.8 mm. long: mature capsules* 5.5–8 mm. long, rarely equal to the calyx,[2] usually *exceeding it by as much as 0.5–3 mm.; seeds* same as in the typical variety except that all examined were winged or rarely rimmed, and often shining.—Robins. in Proc. Am. Acad. xxix. 313 (1894) & in Gray, Synop. Fl. i. 253 (1897); Jepson, Fl. Calif. 493 (1914) and Man. Fl. Pl. Calif. 360 (1923); Munz, Fl. S. Calif. 164 (1935). *Tissa leucantha* Greene, Pitt. i. 301 (1889) and Man. Bot. San Francisc. Bay, 36 (1894). *T. macrotheca* var. *leucantha* (Greene) Jepson, Fl. W. Mid. Calif. 170 (1901). *Alsine leucantha* (Greene) House in Am. Midl. Nat. vii. 134 (1921). *T. leucantha* var. *glabra* Davidson in Bull. S. Calif. Acad. Sci. xxv. 84 (1926). *S. macrotheca* var. *glabra* (Davids.) Munz, Fl. S. Calif. 164

[1] The following have pink-tinged flowers: Stockton, *E. E. Stanford* 838 (U. S.); 5 miles n. of Tulare, *Abrams* 12022 (Pom.); San Jacinto, *Street & Durant* (Pom.). Specimens of all these collections are in the Dudley Herbarium of Stanford University but there the flowers are either white or discolored brown. The lack of pink color is probably due to poisoning.

[2] To be seen in plant from half way between Kerman & Mendota, Fresno Co., *Keck & Stockwell*, 3350, in which the calyx is distinctly equal to the capsule.

(1935).—North America: only in California, in low, alkaline places of the interior valleys from San Diego Co. north to Colusa Co. California: San Diego Co.: Santa Maria, *Alderson* June, 1894 (U. C., G.). Riverside Co.: roadside in damp soil, San Jacinto, *Street & Durant*, May 12, 1918 (Pom., D. S.); vicinity of Perris, *H. M. Hall* 531, May 13, 1897 (U. C.). San Bernardino Co.: strongly alkaline soil, San Bernardino, *Feudge* 566, May 10, 1924 (Pom.); in alkaline soil, San Bernardino Valley, *S. B. Parish* 11719, April 13, 1918 (Cal. Acad.), same, April 20 (G.); vicinity of San Bernardino, *S. B. Parish* 4755, May 11, 1901 (D. S., Pom.). Los Angeles Co.: Studebaker, *Braunton* 307, May, 1902 (U. C., U. S.), in part;[1] near Dry Lake, Antelope Valley, *Burtt Davy* 2256, May 9–24, 1896 (U. C.); alkaline flats with *Adelia neo-mexicana*, 5 miles west of Lancaster on Antelope Valley Road, *Ferris & Rossbach* 9479, May 13, 1938 (D. S., G., calyx pubescent); roadside, Lancaster, *Roxana S. Ferris* 916, June 12, 1918 (Cal. Acad., D. S.). Tulare Co.: Goshen, *K. Brandegee*, May 9, 1916 (U. C.); 5 miles north of Tulare, *Abrams* 12022, May 2, 1927 (Pom., D. S.); alkaline flats, Hanford, *Kearney* 19, June 10, 1907 (U. S.). Kern Co.: Dry Lakes, Mohave Desert, *Davidson* 3618, May, 1926 (Pom., D. S.), type collection of *Tissa leucantha* var. *glabra* Davidson. Fresno Co.: in alkali, on flood plains of San Joaquin River, half way between Kerman & Mendota, *Keck & Stockwell* 3350, May 17, 1935 (D. S., calyx equal to capsule). Merced Co.: alkaline plains, 10 mi. sw. of Merced, *J. T. Howell* 1465, May 2, 1926 (Cal. Acad.). San Joaquin Co.: Lathrop, *Greene*, April 30, 1889 (U. C., U. S.), type collection of *Tissa leucantha* Greene. Contra Costa Co.: Antioch, *K. Brandegee*, May, 1893 (G.). Solano Co.: Vanden, *K. Brandegee*, April 30, 1893 (G.); Vanden, *Eastwood* September 20, 1893 (G.). Yolo Co.: between Woodland and Davis, *Abrams* 12601, May 8, 1928 (Pom., D. S.). Sutter Co.: edge of tule land, *Copeland* 8273, May 29, 1903 (Pom.), det. by Greene. Colusa Co.: near Willows, *Burtt Davy* 4272, May, 1898 (U. C.); Colusa Junction, *K. Brandegee*, April, 1889 (G.).

This variety is easily distinguished from the typical form of the species by its longer stems and longer internodes, white flowers, usually more protruding capsule and somewhat longer style. It would be interesting to study flower-color in the field, for a few specimens in herbaria (see note above) seem to have pink flowers. Since flower-color may change in drying, it may be that flowers of the species are not always pink or rosy and that those of the variety are not always white.

Under *Tissa leucantha*, Greene cites three localities. The collection

[1] Both the species and var. *leucantha* were mounted on the same sheet. Since these were supposedly collected from the same place it is interesting to note that even where the two entities come together their diagnostic characters remain distinct.

from Lathrop is taken as the type. There are no *Greene* collections from Byron Springs and eastern Livermore Valley either at the University of California or the United States National Herbarium. These have not yet been located at Notre Dame but I venture to say that, because of the region from which they came, both the latter collections are probably of var. *longistyla.*

Var. *glabra* Davidson is characterized by being entirely glabrous. Careful examination of the type shows no other difference from the type or general collections of var. *leucantha.* The collection, *Ferris & Rossbach* 9479, taken not far from Davidson's type locality, however, shows pubescent calyces. I do not believe that a general absence of pubescence unsupported by other differences, even when the plants are all found in a given region, warrants their segregation as a variety.

3. Var. **longistyla** var. nov. (TAB. 589, FIG. 1e et 1f), sepalis ovato-lanceolatis, numquam attenuatis, 5.8–7 mm. longis; petalis albis, 5.8–7 mm. longis, sepala aequantibus vel eis 1 mm. longioribus vel brevioribus; stylis 3, ad basim divisis, 2–3 mm. longis: capsulis maturis, 4.6–6 mm. longis, sepala aequantibus vel eis ad 1.8 mm. brevioribus: seminibus eis var. typicae similibus aliquando autem fere nigris et argenteis, plerumque lineis vermiformibus dense intertextis profunde sculptis, areolis inter sculpturam parvis tumulis crebris.—CALIFORNIA: only in central California. Alameda Co.: Niles, *M. E. Jones*, April 10, 1934 (U. C., Pom.); Livermore, *Michener & Bioletti*, April, 1892 (U. S., U. C.); eastern Livermore Valley, *J. T. Howell* 13739, April 10, 1938 (Cal. Acad., good flowers); alkaline marsh along roadside, 1.5 miles west of Altamont, *G. B. & R. P. Rossbach* 611, June 5, 1938 (G. TYPE, D. S., U. S., Cal. Acad., U. C., Pom., B., Ore., N. Y., F. M.); alkaline mud, roadside, 1 mile n. of Mountain House, half way between Altamont and Tracy, *G. B. & R. P. Rossbach* 613, June 5, 1938 (G., D. S., Cal. Acad.); alkaline marsh along roadside about 1.5 miles east of Altamont, *G. B. & R. P. Rossbach* 614, December 30, 1937 (G.). Contra Costa Co.: Byron Springs, *Burtt Davy*, May, 1898 (U. C.); Byron Springs, *Eastwood* 11667, April 28, 1923 (Cal. Acad.); near Martinez, *Burtt Davy*, 6659, June 7, 1900 (U. C.). Napa Co.: Calistoga, *Eastwood* 4639, June 5, 1915 (Cal. Acad., G., U. S.); Calistoga, *Eastwood*, May 7, 1900 (G.); Calistoga Geyser, *M. S. Baker* 2111a, May 1, 1927 (D. S.); damp adobe meadow opposite Myrtledale Geyser, 1.5 miles north of Calistoga, *Bacigalupi* 1254, March 27–28, 1926 (D. S., Pom.); plentiful in stiff adobe near one of hot springs at Calistoga in the blue oak belt, *Heller* 13849, April 12, 1924 (U. S., D. S.); Myrtledale Hot Springs near Calistoga, *J. T. Howell* 1759, March 27, 1926 (Cal. Acad., D. S.); Myrtledale Hot Springs, *Eastwood & J. T. Howell* 5518, May 15, 1938 (Cal. Acad.).[1] MAP 3.

[1] Tulare Co.: 15.7 miles north of Tulare, *F. R. Lawson R.* 62, April 5, 1930 (D. S.)

This variety is distinguished from var. *leucantha* by its longer style, sculptured seeds and never protruding capsule but is similar in lax, long-internoded habit and white flowers. It differs from the typical variety in having white flowers and much longer style. All three entities are similar in fasciculation of leaves, in stipules, and in size of seed.

S. macrotheca itself occasionally has deeply sculptured seeds and the seeds of var. *longistyla* may have the surface softly hubbled and the sculpture only partially evident.

One plant[1] with pink flowers was found at the type locality. This had the capsule equal to and slightly exceeding the calyx, a short style 1.2 mm. long and smooth brown seeds with only delicate traceries and therefore is characteristic *S. macrotheca*.

4. S. MEXICANA Hemsl. (PLATE 589, FIGS. 4a–4c and MAP 4). *Suffruticose perennial: tap-root fibrous-farinaceous, tapering gradually, often becoming 1 cm. thick: caudex* well developed, knotty, branched or unbranched, bearing many (often 20–25) diffuse stems, 3–15 cm. long; *internodes of stem below the inflorescence* slender, 3–20, usually 6–13 mm. long, 0.5–1 mm. in diameter: *leaves* not fascicled (but sometimes small, leafy branches in the axils), linear-filiform, glabrous, mucronate, 5–15 mm. long, 0.5–1 mm. wide: *stipules* inconspicuous, triangular-acuminate, scarious, 2–5 mm. long; *inflorescence* a lax cyme, 1.5–8 cm. long, with lower foliaceous *bracts* duplicating the vegetative leaves but becoming minute above, 2–5 mm. long, *internodes* glandular-pubescent, duplicating vegetative ones: *sepals* ovate-lanceolate, glabrous or with sparse, minute, glandular pubescence, scarious-margined, 2–4 mm. long; *petals* white, ovate, 1.2–2.4 mm. long; *stamens* 10; *styles* 3, 0.2–0.4 mm. long, dividing to base as the ovary matures: *mature capsules* 3–5 mm. long, exceeding calyx by 0.5–1.5 mm.: fruiting pedicels filiform, glandular-pubescent, often reflexed, the lower 2.5–10 mm. long: *seeds brown, rounded in outline, somewhat sculptured in delicate, vermiform pattern, densely covered with large, glandular papillae which are often cup-shaped*, 0.4–0.6 mm. long, *not winged*.—Hemsl. Diagn. Plant. Nov. pt. ii. 17 (1879) and Biol. Centr. Am. i. 72 (1879). *S. neglecta* sensu Hemsl. Biol. Centr. Am. i. 72 (1879), as to citation, Parry & Palmer 58, non *S. neglecta* Syme, Eng. Bot. ii. 129 (1864).[2]

has the style 3 mm. long and, though lacking mature capsules or seed, is probably var. *longistyla*, although all other collections in this vicinity have styles not over 1.8 mm. long and are var. *leucantha*. There is need of field investigation and mature specimens to check upon this locality.

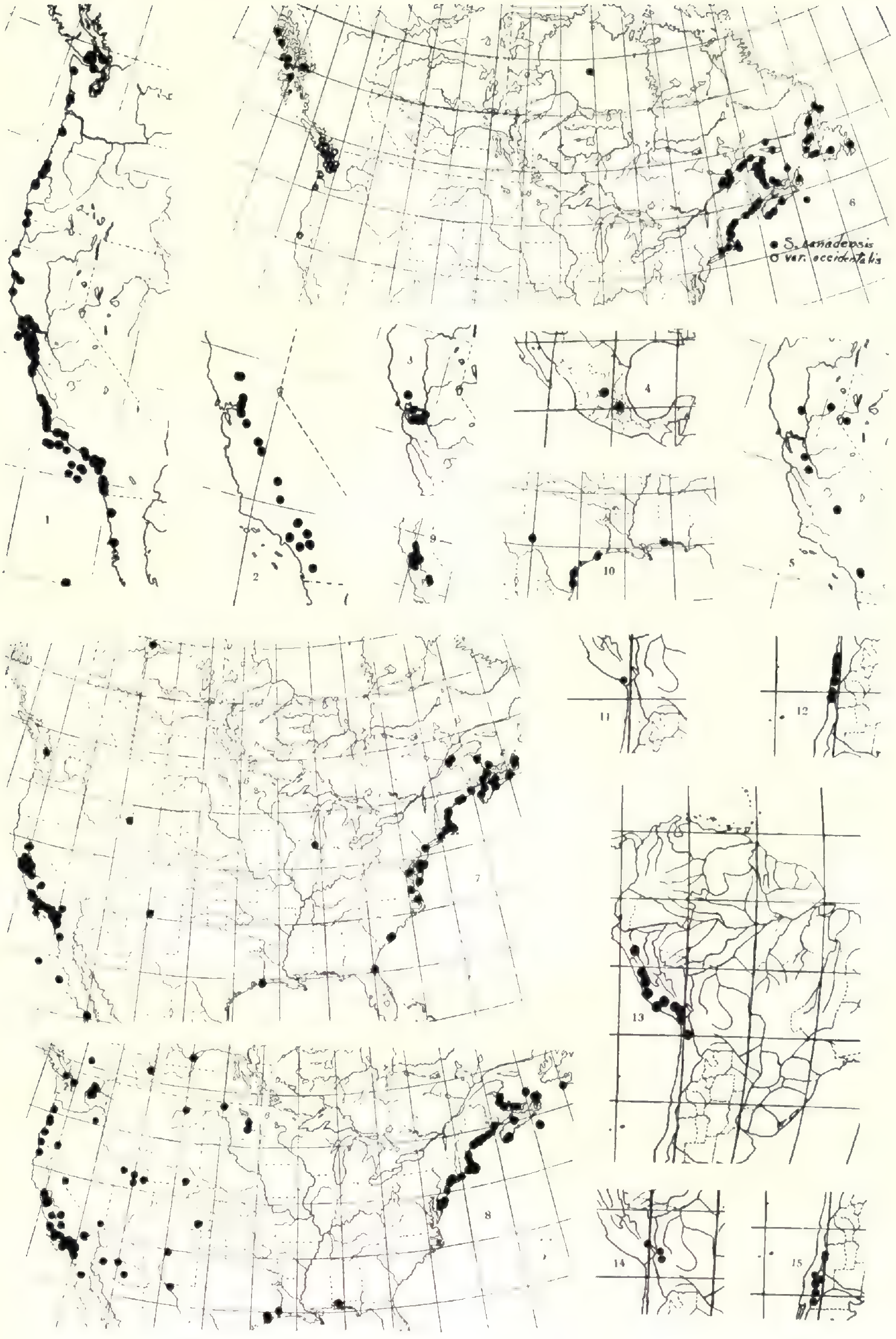
[1] 1.5 miles west of Altamont, Alameda Co., *G. B. & R. P. Rossbach* 612, June 5, 1938 (D. S.).

[2] Which has its source in *Lepigonum neglectum* Kindb., Syn. Lepig. 6 (1856). Later in Kindberg, Mon. Lepig. 37 (1863), *L. neglectum* was given as a synonym of *L. salinum* (J. & C. Presl) Fries, which in turn is a synonym of *Spergularia marina* (L.) Griseb.

Tissa mexicana (Hemsl.) Britton in Bull. Torr. Bot. Club xvi. 129 (1889). *Alsine mexicana* (Hemsl.) House in Am. Midl. Nat. vii. 134 (1921), not *A. mexicana* Bartl. ex Presl, Rel. Haenk. ii. 14 (1825), which is *Minuartia verna* (L.) Hiern fide Prof. Johann Mattfeld in Fedde, Repert. Spec. Nov. Beihefte xv. 172 (1922). North America: known only in Mexico in the states of San Luis Potosí and Hidalgo. Mexico: San Luis Potosí: region of San Luis Potosí, alt. 6000–8000 ft., *Parry & Palmer* 52, 1878 (G., U. S.), type collection, type at Kew, not seen; same data 58, 1878 (G.), type collection of *Spergularia neglecta* Hemsl., type at Kew, not seen; in sands around city, San Luis Potosí, *Schaffner* 137, 1876 (G.), 539, 1879 (U. S., Cal. Acad., B.). Hidalgo: bare hills above Pachuca, alt. 8500 ft., *Pringle* 6913, July 21, 1889 (G., U. S., B., W., U. C., Pom.).

5. S. **atrosperma**, spec. nov. (tab. 589, fig. 3a–3c). Annua: caulibus 1–8, erectis vel patentibus, 5–18 cm. longis: internodiis caulis partium efloriferarum gracilibus, glabris vel villoso-glandulosis, 4–35 mm. longis, 0.5–1.0 mm. crassis; foliis linearibus, carnosis, glabris vel villoso-glandulosis, mucronatis, non fasciculatis, 10–25 mm. longis, 0.5–1.2 mm. latis; stipulis late triangularibus, acuminatis, saepe paullo longioribus quam latis, 1.8–2.8 mm. longis: internodiis cymae filiformibus, glabris vel pubescenti-glandulosis, infimis 10–25 mm. longis: bracteis foliosis, supremis minimis; sepalis ovato-lanceolatis, glabris vel pubescenti-glandulosis, 2.8–4 mm. longis; petalis ovatis, albis vel roseis, 2–2.6 mm. longis; staminibus 4–8, saepe 1–2 abortivis vel ad basim connatis; stylis 0.5–0.8 mm. ad basim divisis: capsulis maturis 3.2–5 mm. longis, sepalis 0.6–1.4 mm. longioribus: pedicellis fructiferis reflexis vel non, filiformibus, plerumque pubescenti-glandulosis, aliquando glabris, 4–8 mm. longis: seminibus nigris, saepe iridescentibus,[1] lineis vermiformibus intertextis areolatis sculptis, saepe profunde sculptis, haud papillatis, 0.6–0.8 mm. longis, non alatis vel aliquando ala imperfecta parva fusca scariosa vel margine angusto nigro.—*Tissa diandra* sensu Britt. in Bull. Torr. Bot. Club, xvi. 128 (1889), in small part, including only the collection "Sierra Valley, *Lemmon*," the remaining collections being of true *S. diandra* and *S. echinosperma*, *q. v.*; sensu Greene, Fl. Francisc. 128 (1891), entirely as to plants discussed; non *Arenaria diandra* Guss. (1827). *Spergularia diandra* sensu Robins. in Proc. Am. Acad. xxix. 310 (1894), in small part, including only the collection "Goshen, *Brandegee*," the remaining plants being *S. diandra* and *S. echinosperma*, *q. v.*, non *Arenaria diandra* Guss. (1827).—North America: only in alkaline places in California and adjacent Nevada. California: Temecula, Riverside Co., *M. E. Jones*, April 24, 1882 (Pom.); dry mud-flat, ½ mile south of Lake Elsinore, Riverside Co., *Munz* 5075, April 29, 1922 (Pom.); plains, Tulare, Tulare Co., *K. Brandegee*, April, 1889 (G.); Goshen, Tulare Co., *K. Brandegee*, April, 1893 (G.); Los Banos Hills, Merced Co., *J. T. Howell* 13826, May 28, 1938 (Cal. Acad. type,

[1] These seeds are black but often have an iridescent tinge over the black.



Ranges of, 1, SPERGULARIA MACROTHECA (typical); 2, S. MACROTHECA var. LEUCANTHA; 3, S. MACROTHECA var. LONGISTYLA; 4, S. MEXICANA; 5, S. ATROSPERMA; 6, S. CANADENSIS and var. OCCIDENTALIS; 7, S. MARINA (with papillose seeds); 8, S. MARINA (with smooth seeds); 9, S. MARINA var. TENUIS; 10, S. ECHINOSPERMA; 11, S. CONGESTIFOLIA (also S. COLLINA); 12, S. ARBUSCULA; 13, S. FASCICULATA; 14, S. ANDINA; 15, S. DEPAUPERATA.

G., D. S., U. S., K., B.); clay soil, dried bed of former rain-pool, 7½ miles sw. of Merced on Los Banos Road, San Joaquin Valley, Merced Co., *J. T. Howell* 4145, April 11, 1929 (Cal. Acad.); Merced Co., *Mangst*, May, 1886 (U. C.); moist alkali, south slope about 3 mi. up the canyon, Corral Hollow, San Joaquin Co., *York*, April 2, 1935 (D. S.); 4 miles east of Williams, alkali plains, Colusa Co., *Roxana S. Ferris* 509, April 12, 1917 (D. S.); Colusa Junction, Colusa Co., *Brandegee*, April, 1889 (G.); Sierra Valley, Sierra Co., *Lemmon*, June 22, 1874 (G.). Nevada: alt. 5000 ft. south of Carson City, Ormsby Co., *M. E. Jones*, June 2, 1897 (U. S., Pom.). Map 5.

S. atrosperma differs from *S. diandra* in having larger seeds, which are more coarsely sculptured and have an iridescent tinge, longer stipules, and usually a slightly larger capsule. Otherwise the two species may be easily confused. Examination of many Old World specimens of *S. diandra* has convinced me that the seeds of *S. atrosperma,* though similar, are too large to be included in the Old World species.

6. S. diandra (Guss.) Boiss. (Plate 589, figs. 5a–5c). Annual: with 2–∞ slender, prostrate or diffuse stems, 5–15 cm. long: *internodes of stem below the inflorescence* slender, glandular-pubescent to nearly glabrous, 4–23 mm. long, 0.4–1.2 mm. in diameter; *leaves* linear, glandular-pubescent, shortly mucronate, 10–25 mm. long, 0.5–1 mm. wide; *stipules small, deltoid, acuminate, often slightly longer than broad,* 1–2 mm. long; *internodes* of inflorescence glandular-pubescent, the lowest 7–18 mm. long; *bracts* foliaceous, becoming minute above, 2–15 mm. long: *sepals* ovate-lanceolate, blunt-tipped, glandular-pubescent, 2.6–3.6 mm. long; *petals* rosy or white with pink toward the apices, ovate, 1.8–2.8 mm. long, as much as 0.5–1.2 mm. shorter than the calyx; *stamens* 4–7; *styles* 3, separated to the base, 0.4–0.6 mm. long; *mature capsules almost globose,* 2.6–4 mm. long, equal to or as much as 0.5 mm. longer than the calyx: *fruiting pedicels* filiform, glandular-pubescent, erect or spreading, 4–11 mm. long: *seeds black with a silvery tinge, pyriform, usually sculptured in interwoven, vermiform pattern, so that there are narrow, short, molded ridges between,* occasionally nearly smooth, sometimes with scattered, small, black papillae, 0.4–0.5 mm. long, not winged.—Fl. Orient. i. 733 (1867); Robins. in Proc. Am. Acad. xxix. 310 (1894), in part, including only the Oregon and Washington plants, excluding the California and Texan collections which are *S. atrosperma* and *S. echinosperma* respectively. *Arenaria diandra* Guss. Prod. Sic. i. 515 (1827). *A. salsuginea* Bunge in Ledeb. Fl. Alt. ii. 163 (1830); Ledeb. Ic. Pl. Fl. Ross. Alt. Illus. v. t. 409 (1834), although no previous author cited. *Alsine diandra* (Guss.) Guss. Fl. Sic. Syn. i. 501 (1842); House in Am. Midl. Nat. vii. 134 (1921). *Spergularia salsuginea* (Bunge) Fenzl in Ledeb. Fl. Ross. ii. 166 (1844–46); Robins. in Gray, Synop. Fl. 251 (1897). *Lepigonum diandrum* (Guss.) Nym. Syll. Fl. Eur. 250

(1854–55); Kindb. Synop. Lepig. 7 (1856), as to source of name not as to plants described.[1] *L. salsugineum* (Bunge) Fisch. & Meyer, Ind. Sem. Hort. Petrop. i. 10 (1835); Kindb. Synop. Lepig. 7 (1856) and Mon. Lepig. 42. t. iii. fig. 30 (1863). *S. atheniensis* Heldr. & Sart. ex Nym. Consp. 123 (1878–1882), an herbarium name given as a synonym of *S. diandra* (Guss.) Boiss. *Tissa diandra* (Guss.) Britt. in Bull. Torr. Bot. Club, xvi. 128 (1889), in part, including only *Suksdorf* and *Henderson* collections, excluding the Californian and Texan collections; Brandegee, Proc. Calif. Acad. ser. 2. ii. 131 (1889), as to source of name, not as to plants discussed which are *S. marina;* Howell, Fl. Nw. Coast, 89 (1903), in part, including Columbia valley plants, excluding the Texan plants. *Buda diandra* (Guss.) Kuntze, Rev. Gen. 50 (1891). *S. salsuginea* var. *bracteata* Robins. in Gray, Synop. Fl. i. 251 (1897), in part, including the Oregon and Washington plants, excluding the Texan collections. *Tissa bracteata* (Robins.) Small, Fl. Se. U. S. 418 (1903), in part, including only the Washington plants, excluding the Californian and Texan collections. *T. diandra* var. *bracteata* (Robins.) Piper in Contrib. U. S. Nat. Herb. xi. (Fl. State Wash.) 264 (1906), in part, including the *Suksdorf* collections, excluding *Sandberg & Leiberg* 346, which is *S. marina;* Piper & Beattie, Fl. Se. Wash. and Adjac. Idaho, 98 (1914). *S. bracteata* (Robins.) Nelson & Macbride in Bot. Gaz. lxi. 30 (1916); St. John, Fl. Se. Wash. and Adjac. Idaho, 144 (1937). *Alsine bracteata* (Robins.) House in Am. Midl. Nat. vii. 134 (1921).—North America: introduced from the Old World[2] into Oregon, Washington, and Idaho in the Columbia and Snake River valleys; and perhaps locally in Massachusetts and Georgia. Oregon: roadsides, Oswego, Clackamas Co., *Howell*, June, 1888 (Ore.); muddy shore of Columbia River, on Hayden Island, opposite Vancouver, Wash., *J. C. Nelson* 2958, Oct. 11, 1919 (G.). Washington: sandy bank of the Columbia River, w. Klickitat Co., *Suksdorf* 176, September, 1883 (G.); same loc. and collector, 2082, October 18, November, 1891 (G., U. S., U. C.); sandy river bank, Bingen, w. Klickitat Co., *Suksdorf* 2082, September–November, 1904, April, 1891 (U. C., D. S., Ore.). Idaho: gravel bars, alt. 3500 ft., Boulder Creek, Owyhee Co., *Macbride* 514, July 31, 1910 (G., U. S., D. S.).

The following specimens agree well but not exactly with the above plants. They are placed here for lack of thorough knowledge of Old World species to one of which they certainly must belong.

Massachusetts: Patuisset Island, Pocasset, Bourne, Barnstable Co., *J. A. Cushman* 8512, August 14, 1912 (New England Bot. Club). Georgia: Biltmore Herbarium, no collector, 1685a, Camden Co., March 29, 1902 (D. S., Pom.).

(*To be continued*)

[1] Later in 1863, Kindberg, Mon. Lepig. 35, refers this to *Lepigonum campestre* Kindb., which equals *S. Bocconi* (Scheele) Foucaud.

[2] Old World specimens from Spain, Greece, Tripoli, Morocco and Central Asia have been examined by the author.

CYPERUS POLYSTACHYOS VAR. FILICINUS

Hugh O'Neill

In Rhodora **19**: 153 (1917), Fernald states he is unable to find any absolute character by which to separate *C. microdontus* specifically from *C. filicinus*. He further states that "occasionally colonies show scales intermediate in length and clearly bridging the gap between the two." Measurements made by the author on a large number of specimens from widely separated points in the range, confirm Fernald's conclusion.

In das Pflanzenreich **4**[20]: 37 (1936) Kükenthal writes of *C. microdontus:* "Mihi magis C. fugaci Liebm. sese appropinquare videtur, nullam veram differentiam video." He suggests calling *C. microdontus: Cyperus polystachyos* Rottb. var. *leptostachyus* Boeck. f. *fugax* Liebm.

A study of a considerable number of specimens indicates *C. filicinus* Vahl and *C. polystachyos* Rottb. as the extremes of a single continuous series of closely intergradient forms. The following table shows the impossibility of making any clear separation of *C. microdontus* from *C. polystachyos* var. *leptostachyus* Boeck., i. e. var. *texensis* (Torr.) Fern.

A single tuft often shows both subcapitate and open-umbellate inflorescence and other characters of intermediate nature, e. g. *Langlois*, Pass Christian, Miss., Oct. 1882; *Martindale*, St. Augustine, Fla.; *Curtis*, Jacksonville, Fla. 3049; *O'Neill* 8994, British Honduras; *Tharp* 1766, Texas; *Correll* 5781, Fla.; *Chapman*, Fla.

It therefore seems appropriate to include *C. microdontus* under *C. polystachyos* var. *texensis* and to regard *C. filicinus* as:

C. polystachyos Rottb. var. **filicinus** (Vahl) comb. nov. *C. filicinus* Vahl, Enum. Pl. **2**: 332. 1806. Maine: *Moldenke* 6364. New Hampshire: Port Monmouth, *Dautun*. Massachusetts: *Seymour* 1090; Newburyport, *Steele; Bartlett* 1397, 1400; Squantum, *Davis;* Watertown, *Steele;* Boston, *Forbes; Blake* 9660; *Fernald* 32; *Moore* 3237; Monomoy Point, *Brainerd;* Nantucket, *Deane*. Rhode Island: Providence, *Congdon; Blake* 3050; Portsmouth, *Fox; Fernald and Long* 8832. Connecticut: Stratford, *Eames;* New Haven, *Kleeberger; Harger* 6979; New Haven, *Schallert*. New York: Flushing, L. I., *Hunt; Miller* 41; Ocean Beach, *Lighthipe;* Northville, *Young*. New Jersey: Cape May, *Witte; Rugel; Holmes* 426; Atlantic City, *Wheeler;* Ocean City, *Bro. Arsène; Moldenke* 4010; *Redfield* 8571. Pennsylvania: Philadelphia, Navy Yard, *Porter*. Delaware: *Larsen* 358. Maryland: Worcester County, *Shreve; Bartlett* 1855; *Redmond* 500; Rock Point, *Holm; O'Neill* 7194 and 7192; *Smith* 395.

TABLE 1

CYPERUS POLYSTACHYOS Rottb.

	Spikelets	Bract	Achene	Infl.	Glume	Rays
Fernald & Long. Pl. Ex. Gray. 321. Mass.	1.5 x 8	1	1.0 x 0.4	Subcap.	1.8 x 1.0	1
[1] Curtiss 3050, Fla.	1.5 x 22	3	1.1 x 0.4	U. C.	2.0 x 1.3	7
Cory 20454, Texas	1.2 x 20	2	Unripe	Cap.	1.8 x 1.3	0
Seymour 7, Miss.	1.6 x 12	2	1.2 x 0.5	Subcap.	2.4 x 1.5	3
Reed, Duke 28885, N. C.	2.0 x 12	1	1.1 x 0.4	Subcap.	2.1 x 1.5	1
Moldenke 5270, Fla. (Same as Curtiss 3050)	1.8 x 30	3.5	1.1 x 0.4	Subcap.	2.0 x 1.2	0
O'Neill 7193, Md.	1.4 x 11	2	1.0 x 0.4	Subcap.	1.5 x 1.2	3
O'Neill 7204, Fla.	1.5 x 12	3	1.0 x 0.3	Umb.	1.5 x 1.1	5
(O'Neill 1067, 7206, 6233, 2597, 1123, 5089, 7205, 5257, 5258, 5259, 5260, 5261, 522 are all substantially the same as 7193 and 7204 and are all from Florida)						
Langlois, Bay St. Louis, Miss.	1.5 x 11	1	1.2 x 0.5	Subcap.	2.1 x 1.2	0
Mohr, Mobile 1897, Ala.	1.4 x 9	1	1.0 x 0.4	Subcap.	1.6 x 1.5	0
Uphof, Conway, Fla.	1.3 x 9	3	1.0 x 0.4	S. U.	1.8 x 1.2	3
[2] Wilson 487, Cuba	1.2 x 18	2	1.0 x 0.3	Umbell.	1.8 x 1.5	8
[3] Killip 4037, Panama	1 x 8	2 or 3	1.0 x 1.4	Spikes few	1.5 x 1.5	1
[4] Curtiss 3049, Fla.	1.3 x 12	3	1.0 x 1.4	Umbell.	2.0 x 1.5	5
Nash 2494, Fla.	1.3 x 12	2	1.0 x 1.4	Subcap.	1.7 x 1.5	0
O'Neill 8993, Guatemala	1.3 x 14	3	1.0 x 1.4	Subcap.	2.1 x 1.4	3
O'Neill 8995, British Honduras	1.3 x 18	3	1.0 x 0.3	S. U.	2.1 x 1.3	6
Lundell 4740, Yucatan	1.2 x 16	2	1.0 x 0.3	Cap.	2.0 x 1.3	0
Gentry 2045, Rio Mayo, Sonora, Mexico	1.5 x 18	2	1.2 x 0.5	Umbell.	2.0 x 1.2	4

[1] *C. polystachyos* var. *leptostachyus* f. *splendens* Kükenthal.

[2] Cited by C. B. Clarke as *Pycreus polystachyos* Beauv. var. *laxiflora* Ridley.

[3] Determined by Standley as *C. fugax* Liebm.

[4] Cited as *C. polystachyos* var. *leptostachyus* Boeckl. by Kükenthal.

Legend: Subcap. = Subcapitate
U. C. = Umbellate and Capitate
S. U. = Subcapitate and Umbellate

North Carolina: Elizabeth City, *Bro. Marcellus.* Alabama: Mobile, *Mohr:* Mobile Bay, *Mohr.* Florida: *Curtiss* 5718, 4079; Jacksonville, *Hitchcock.* Louisiana: *Tracy et Lloyd,* Breton Island; St. Martinville, Pointe a la Hache, *Langlois.*

C. polystachyos Rottb. var. texensis (Torr.) Fern. Massachusetts: *Fernald* 321; *Bacigalupi* 1910, 2127. Maryland: *O'Neill* 7193 and 9077; *Smith* 398. District of Columbia: *Steele* 1896. Virginia: *Heller* 1213. North Carolina: Oak Island, Roxboro, 7228, White Lake, 33630A, *Blomquist; Oosting* 33593, 33753; *Correll,* 4856; Caswell County, Beaufort Co., Wake Co., Orange Co., Franklin Co., New Hanover Co., *Reed.* South Carolina: Frogmore, *Cuthbert.* Georgia: *Svenson* 7227; *Reade* E8049; *McVaugh* 61, 205; *Bartlett* 968, 1156. Alabama: St. Bernard, *Wolf;* Mobile, *Mohr;* Auburn, *Earle.* Florida: *Correll,* 5582, 5593, 5635, 5722, 5781, 5783, 5809, 5862, 5872, 5873, 5898, 5934, 5891, 5944, 5951, 6080, 6302, 6338, 6364, 6424; *Leonard* 1123; *O'Neill* 2597, 5258, 5259, 5257, 5262, 5261, 7204, 7206, 1067; *Scott,* Palatka; *Tracy* 7005; *Curtiss* 3049, 4078, 5004; *Moldenke* 494, 588, 798, 1042, 5780; *Nash* 482, 1023, 2494; *Deam* 1927, 2754; Eustis, *Hitchcock;* Ft. Myers, *Standley; McFarlin* 4718; Winter Park, *Uphof;* Jacksonville, *Leeds; Rugel* 606; Tampa, *Ferguson;* Gainesville, *Chester;* Naples, *Rhodes.* Arkansas: *Heller* 4131. Tennessee: *Svenson* 4372. Mississippi: Horn Island, *Seymour;* Ocean Springs, *Macfarlane;* Biloxi, *Tracy; Seymour* 7. Louisiana: *Palmer* 8943; Pointe a la Hache, St. Martinville, *Langlois.* Texas: *Tharp* 1766, 4629, 1777, 3204, 3203, 9184, 3043; San Jacinto River, 2373, *Tharp;* Texarkana, *Letterman;* Galveston, *Fisher;* Crosby, *Fisher; Cory* 20317, 30318, 20454; *Young* 7; Ottine, 6264, *Bogusch; Hall* 676; *Reverchon* 2283A; *Palmer* 10630; Angelina Co., *Boon.* Mexico: *Gentry* 2045, 2040; *Salitral* 1576; Vera Cruz, *Fisher.* Cuba: *Wilson* 487, 1282, 1663, 1546; *Baker* 2417, 3543, 3450; *Shafer* 125; *Van Hermann* 131. Central America: *Lundell* 4740, 5004, 7004; *O'Neill* 8993, 8994, 8995, 8992; *Gentle* 1934; *Schipp* 920. Brazil: *Martius* 18880. Argentina: *Venturi* 7116.

Langlois Herbarium
Catholic University of America

FURTHER NOTES ON COASTAL FLORAL ELEMENTS IN THE BOGS OF AUGUSTA COUNTY, VIRGINIA

Lloyd G. Carr

Upon examining the flora in southeastern Augusta County on the west slope of the Blue Ridge, there is noted a distinct and characteristic coastal floral element in association with other interesting plants primarily of the uplands, which are also considered in the discussion.

The area affords varied habitats for the coastal species in its ponds, bogs, and grassy meadows.

The ponds are situated at an altitude of 1600 feet and represent filled-in limestone sinks that are fed by numerous springs. However, there is no outcropping of limestone here, for this is completely covered by sandy wash and talus at the foot of the Blue Ridge. The coastal species appear to be assembled around six general pond-centers with the exception of Magnolia Swamp—Blue Pond, Spring Pond, Lipscomb Pond, Mountain Lake (Shenandoah Acres), Green Pond, and Hattan's Pond regions. A marked difference is noted in the vegetative aspects of these regions.

Blue Pond has growing near its edge *Utricularia radiata* Small and several species of *Potamogeton*. Nearby there is an extensive meadow of *Woodwardia virginica* (L.) Smith and *Hypericum petiolatum* Walt.

Spring Pond lies in the heart of the flatwoods and is well hidden by the shrubby overgrowth on its edge. *Orontium aquaticum* L. is the predominant growth in the rather shallow expanse. *Utricularia geminiscapa* Benj. (*U. clandestina* Nutt.) adheres to the gelatinous stems of *Brasenia Schreberi* Gmel. *Utricularia gibba* L. is also present. Intermediate between the shrubby edge and the body of water are sphagnum hummocks on which grow *Panicum hemitomon* Schultes, *Scirpus subterminalis* Torr., *Eriocaulon septangulare* With., *Xyris torta* Sm. (*X. flexuosa* of the Manuals, not Muhl.), *Arethusa bulbosa* L., *Calopogon pulchellus* (Sw.) R. Br., and *Eupatorium verbenaefolium* Michx. The shrubby edge contributes *Rhododendron viscosum* (L.) Torr., *Viburnum nudum* L. and *Gaylussacia dumosa* var. *Bigeloviana* Fernald. In nearby cranberry meadows are *Rhexia mariana* L., *R. virginica* L., *Sabatia gracilis* (Michx.) Salisb., *Solidago tenuifolia* Pursh, *Helenium virginicum* Blake, and *Panicum virgatum* L. *Spiranthes Beckii* Lindl. occurs here especially in sandy, rocky spots along the roads that are used for transporting wood from the mountains. *Lygodium palmatum* (Bernh.) Sw. climbs over *Benzoin aestivale* (L.) Nees along the mountain creeks.

Around Lipscomb Pond in the same general region there is an interesting find. *Solidago graminifolia* var. *polycephala* Fernald occurs along a stream running from the pond in which grows *Utricularia radiata*. Lipscomb Pond is exposed, lying amid apple trees.

Mountain Lake (Shenandoah Acres) with its adjoining meadows contributes many significant plants to the coastal list. On its sandy

edge in five or six inches of water are *Eleocharis melanocarpa* Torr., *Utricularia fibrosa* Walt., and *Xyris caroliniana* Walt. In the adjoining grassy and sedgy meadows appear *Calamagrostis cinnoides* (Muhl.) Barton, *Rynchospora gracilenta* Gray, *Carex sterilis* Willd., *C. Mitchelliana* M. A. Curtis, *Juncus dichotomus* var. *platyphyllus* Wiegand, and *Juncus scirpoides* Lam. Throughout the meadows, amid cranberry vines *Habenaria lacera* (Michx.) R. Br., *H. ciliaris* (L.) R. Br., *Calopogon pulchellus, Aletris farinosa* L., and *Xyris torta* predominate. The shrubby aspects of the meadow are characterized by *Hypericum densiflorum* Pursh, *Prunus cuneata* Raf., and *Gaylussacia dumosa* var. *Bigeloviana.* In the dryer portions of the meadow, in white sand, *Desmodium sessilifolium* (Torr.) T. and G. appears, as a new record for the state. In similar habitats *Comandra umbellata* (L.) Nutt., *Rhexia mariana* and *R. virginica* are found.

Green Pond differs from the other regions in possessing an expanse of water that is totally covered with *Nymphaea advena* Ait. However, on the edge coastal species are represented by *Hibiscus palustris* L., *Lysimachia radicans* Hook., *Stachys hyssopifolia* Michx. and *Hypericum petiolatum.* Green Pond is hidden in the flatwoods by numerous oaks, persimmons, gums, and pines. In several semipermanent ponds, *Isoetes virginica* Pfeiffer, *Helenium virginicum* and *Juncus debilis* Gray are found.

The Hattan's Pond region comprises a much overgrown grassy, cranberry meadow. *Lachnanthes tinctoria* (Walt.) Ell. is here as a relic of a tropical family once widespread in Eastern U. S., but now confined to the coastal strip in the U. S. *Glyceria obtusa* (Muhl.) Trin. is a conspicuous grass in the meadow flora.

Magnolia Swamp affords great interest for the botanist in its varied floral elements. *Magnolia virginiana* L., *Ilex verticillata* (L.) Gray, and *Pinus rigida* Mill. are characteristic plants of the wooded portion. Beneath the arboreal growth *Helonias bullata* L., another member of a once widespread flora, is rooted in black muck. The meadow portion furnishes mucky soil permanently water-soaked, for *Scleria reticularis* var. *pubescens* Britton, *Carex Longii* Mackenz., *C. debilis* var. *pubera* Gray, *Sisyrinchium atlanticum* Bick., *Oenothera fruticosa* var. *vera* Hook., and *Xyris torta* and *Utricularia subulata* L. *Panicum longifolium* Torr. is an interesting representative of the coastal grass flora.

An explanation of the appearance of this coastal flora in the flat-

woods of the Blue Ridge and farther out in the valley province requires a survey of the physiographic history of the provinces concerned.

Since Cretaceous and early Tertiary time to the present the flatwoods of the Blue Ridge and the Shenandoah Valley proper have undergone cycles of erosion. Watson and Cline define four cycles of erosion. During Cretaceous times the entire Appalachian Upland was reduced to a peneplain (Kittatinny Cycle). An uplift of the Kittatinny Plain rejuvenated the stream and a second cycle of erosion was inaugurated in early Tertiary.

At the close of the Tertiary Cycle streams were rejuvenated by uplift of the region and a new cycle designated as the Shenandoah was begun, which resulted in the development of the Shenandoah plain in the valley limestone.

A third uplift of the region brought the Shenandoah cycle of erosion to a close, and thus was entered upon a new or recent cycle of erosion in early Pleistocene.

The presence of a widespread peneplain comprising the Appalachians during Cretaceous and early Tertiary times afforded conditions for a widespread flora that as yet had not been segregated into distinct categories correlated with provinces. Thus those species that are now termed coastal were widespread until subsequent uplifts brought about a change in the floral aspects of the Appalachian Uplands. The hydrophytic types accustomed to low, swampy, siliceous conditions were forced to retreat. But in certain regions of the Appalachians where grassy meadows, ponds, and bogs abound, coastal species exist as remnants of a widespread flora. Professor Fernald has graphically presented the residual idea in several of his recent papers. It appears significant to state some of his opinions here. "The Coastal Plain flora of Atlantic North America is distinguished by the abundance of tropical groups represented. Although these plants now chiefly occupy siliceous, peaty and aquatic habitats in comparatively youthful regions of eastern North America, it is probable that they or their progenitors formerly existed on the area of the ancient Appalachian Upland, especially in the Cretaceous, when that primitive region of the continent was base-leveled and reduced essentially to sea-level and at the time when the tropical groups of today were widespread in the North. Then with the Tertiary uplift of the Appalachian region and its final conversion into a vast well-drained mesophytic area

available to the groups which now constitute the climax forests of the Appalachian Upland, the Cretaceous xerophytes and hydrophytes which had previously occupied the ground gradually moved out to the newly available and for them more congenial Coastal Plain and similar habitats to the west and northwest."

So it appears that the physiographic features have been favorable for the maintenance of the now recognized coastal types that were once spread as a partially cosmopolitan flora during Cretaceous and Tertiary times.

Summary of Species by Regions

Blue Pond

Utricularia radiata Small. Floating in water. Inflated petioles conspicuous. No. 129 (Gray Herb. and Va. Flora Herb., at U. Va.).

Woodwardia virginica (L.) Smith. Radiates from semipermanent ponds forming a very thick growth, so as to exclude other plants from its place of dominance.

Hypericum petiolatum Walt. Moist sandy situations around semipermanent ponds that merge into meadow-like situations.

Spring Pond

Orontium aquaticum L. Dominant throughout shallow expanse.

Utricularia geminiscapa Benj. (*U. clandestina* Nutt.). Floating and adhering to stems of *Brasenia Schreberi.* No. 382 (Gray Herbarium and Virginia Flora Herb., U. Va.); no. 316 (U. of Penn. Herb.).

Brasenia Schreberi Gmel. Intermingled with *Orontium aquaticum,* near edge of pond. No. 24 (Va. Flora Herb., U. Va.).

Utricularia gibba L. Attached to pieces of old logs, sphagnum and stems of other aquatics. No. 128 (Va. Flora Herb., U. Va.).

Panicum hemitomon Schultes. Sphagnum situations, in slight abundance.

Scirpus subterminalis Torr. Aquatic on edge of pond.

Eriocaulon septangulare With. Growing at varied depths from edge outward among *Potamogeton.* No. 21 (Gray Herbarium).

Xyris torta Smith (*X. flexuosa* of the manuals, not Muhl.). Rooted in sphagnum hummocks.

Arethusa bulbosa L. In peaty soil on edge of pond, ample shade. No. 54 (Va. Flora Herb., U. Va.).

Calopogon pulchellus (Sw.) R. Br. In sphagnum. No. 61 (Va. Flora Herb., U. Va.).

Eupatorium verbenaefolium Michx. In sphagnum hummocks bordering pond. No. 361 (Gray Herb. and Va. Flora Herb., U. Va.).

Rhododendron viscosum (L.) Torr. Comprising shrubby growth on edge of pond.

Viburnum nudum L. Intermingled with *Rhododendron viscosum.* No. 407 (Va. Flora Herb., U. Va.); no. 408 (Gray Herb.).

Gaylussacia dumosa var. Bigeloviana Fernald. Edge of pond. No. 138 (Va. Flora Herb., U. Va.).

Rhexia mariana L. Moist swampy meadow in flatwoods. No. 11 (Gray Herbarium); no. 389 (Va. Flora Herb., U. Va.).

Rhexia virginica L. Intermingled with the last species. No. 13 (Va. Flora Herb.).

Sabatia gracilis (Michx.) Salisb. Growing in meadows with *Rhexia.* No. 9 (Va. Flora Herb., U. Va.); no. 10 (Gray Herb.).

Solidago tenuifolia Pursh. In grassy sandy meadows, inundated for a part of the year. No. 310 (Gray Herb.).

Helenium virginicum Blake. Type locality, growing in meadow with *Rhexia* and *Sabatia.* No. 139 (Gray Herb.).

Panicum virgatum L. Open meadows in flatwoods. No. 315 (U. of Penn.); no. 384 (Gray Herb.).

Spiranthes Beckii Lindl. On sandy banks and along woodland roads. No. 56 (Gray Herb.).

Lygodium palmatum (Bernh.) Sw. Climbing over shrubs along Kennedy Creek. No. 67 (Gray Herb.).

Lipscomb Pond

Solidago graminifolia var. polycephala Fern. Open territory near pond. No. 349 (Gray Herb.).

Utricularia radiata Small. Floating in pond among *Potamogeton.*

Mountain Lake (Shenandoah Acres)

Eleocharis melanocarpa Torr. Rooted to sandy edge of lake in five or six inches of water. Nos. 422, 436, 499 (Gray Herb.).

Utricularia fibrosa Walt. In association with the above species. No. 130 (Va. Flora Herb., U. Va.); no. 490 (Gray Herb.).

Xyris caroliniana Walt. On sandy edge of lake in sphagnum and in water. No. 293 (U. of Penn.); no. 398 (Gray Herb.).

Calamagrostis cinnoides (Muhl.) Barton. Growing from extensive areas of *Carex strictior* Dewey. No. 497 (Gray Herb.).

Rynchospora gracilenta Gray. Boggy meadows adjoining lake. No. 303 (Gray Herb. and U. of Penn.).

Carex sterilis Willd. Growing with the above species. No. 492 (Gray Herb.).

Carex Mitchelliana M. A. Curtis. In boggy meadow. No. 350 (Va. Flora Herb., U. Va.).

Juncus dichotomus var. platyphyllus Wiegand. With other sedges in grassy meadows. No. 403 (Gray Herb.).

Juncus scirpoides Lam. Growing in cranberry meadows. No. 500 (Gray Herb.).

Habenaria lacera (Michx.) R. Br. In moist situations with sedges.

Habenaria ciliaris (L.) R. Br. In moist sphagnous situations. No. 473 (Gray Herb.).

Calopogon pulchellus (Sw.) R. Br. Abundant in meadows adjoining lake.

Aletris farinosa L. In drier parts of meadows. No. 234 (Va. Flora Herb., U. Va.).

Xyris torta Sm. (*X. flexuosa* of the Manuals, not Muhl.). On edge of lake in sphagnum. No. 194 (Va. Flora Herb., U. Va.).

Hypericum densiflorum Pursh. In very moist spots in meadow. No. 499 (Gray Herb.).

Prunus cuneata Raf. A low shrub in dry portions of meadows. No. 282 (Va. Flora Herb., U. Va.); no. 358 (Gray Herb.).

Gaylussacia dumosa var. Bigeloviana Fernald. In drier parts of sandy meadows. No. 409 (Gray Herb.).

Desmodium sessilifolium (Torr.) T. and G. On edge of lake radiating into the drier spots of the adjoining territory. No. 345 (Va. Flora Herb., U. Va.); no. 168 (U. of Penn. Herb.).

Comandra umbellata (L.) Nutt. In sandy soil. No. 498 (Gray Herb.).

Rhexia mariana L. Edge of lake. No. 12 (Va. Flora Herb.).

Rhexia virginica L. Edge of lake. No. 175 (Gray Herb.).

Green Pond

Nymphaea advena Ait. Occupying major portion of pond.

Hibiscus palustris L. (*H. Moscheutos* L.). On edge of pond. No. 136 (Va. Flora Herb., U. Va.); no. 292 (U. of Penn. Herb.); no. 362 (Gray Herb.).

Lysimachia radicans Hook. In depressions near outlet. No. 360 (Gray Herb.).

Stachys hyssopifolia Michx. With the above species. No. 23 (Gray Herb.).

Hypericum petiolatum Walt. Depressions on pond's edge. No. 291 (Gray Herb. and U. of Penn. Herb.).

Isoetes virginica Pfeiffer. Semipermanent ponds. No. 140 (Gray Herb.); no. 458 (Gray Herb.).

Helenium virginicum Blake. Semipermanent ponds with *Isoetes*. No. 309 (U. of Penn. Herb.).

Juncus debilis Gray. With the *Isoetes*. No. 434 (Gray Herb.).

Hattan's Pond

Lachnanthes tinctoria (Walt.) Ell. In overgrown cranberry meadow. No. 20 (Gray Herb.); no. 294 (U. of Penn.).

Glyceria obtusa (Muhl.) Trin. With the Red Root. No. 314 (Gray Herb. and U. of Penn. Herb.).

Magnolia Swamp

Magnolia virginiana L. Rather large inland colony. No. 99 (Gray Herb.); no. 146 (Va. Flora Herb., U. Va.).

Ilex verticillata (L.) Gray. Comprising a part of arboreal growth of the swamp. No. 115 (Va. Flora Herb., U. Va.).

Helonias bullata L. Growing in peaty soil below magnolias.

Scleria reticularis var. pubescens Britton. Occupying meadow portion of boggy spots. No. 451 (Gray Herb.); no. 304 (Gray Herb. and U. of Penn. Herb.).

Carex debilis var. pubera Gray. In boggy mire of meadow portion. No. 423 (Gray Herb.).

Sisyrinchium atlanticum Bick. Intermingled with bog sedges. No. 428 (Gray Herb.).

Carex Longii Mack. In boggy meadow. No. 416 (Gray Herb.).

Oenothera fruticosa var. vera Hook. In sphagnum. No. 100 (Gray Herb.).

Xyris torta Sm. In boggy meadow. No. 106 (Gray Herb.); no. 305 (U. of Penn. Herb.).

Utricularia subulata L. Beneath sedges rising from mucky level, slightly covered with water. No. 317 (U. of Penn. Herb.).

Panicum longifolium Torr. In boggy areas. No. 455 (Gray Herb.).

Acknowledgement

Appreciation is expressed to Dr. Ivey F. Lewis for suggestions and advice, and to Dr. John M. Fogg for assistance in determining the critical material. For the hospitality extended by Dr. and Mrs. Fogg during my stay at the University of Pennsylvania and the Philadelphia Academy of Science, I also express appreciation.

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University of Virginia

Pensylvanicus or pennsylvanicus?—In recent years, in fact since Torrey and his successors, the specific epithet *pensylvanicus* (*a, um*) has been very generally spelled with two n's in the first syllable. This, of course, is in accord with the present spelling of the name of the state, Pennsylvania. Whenever, therefore, we go back to the original spelling of the specific epithet derived from that of the state, protests come in, for we have so long been accustomed to the liberties taken with original spellings by a great series of botanists that we are inclined to think the original spelling wrong and needing alteration. In 1917, in discussing *Polygonum pensylvanicum*, I wrote: "The specific name *pensylvanicum* was consistently so written by Linnaeus and by his contemporaries, but in most modern works it has been made to agree with modern geographic usage and written '*pennsylvanicum*,' apparently under the impression that an orthographic error is thus being corrected. Maps of the 18th century generally show the spelling *Pensylvania* so that it appears that Linnaeus, Lamarck and others who wrote the specific name with a single *n* in the first syllable were not committing an orthographic error but were following the authorized spelling of their day." (Rhodora, xix. 70.) Incidentally, of course, William Pen or Penn used both spellings; Pepys, writing of him, used the first.

Since the protests continue to come in whenever one of these original spellings is taken up, it has seemed worth while to see whether a "standardized" spelling with the double n of recent usage is justified. The species in the flora of eastern North America which now have or which have recently borne the offending name are as follows. If in a half-hour's compilation I have overlooked a name its omission will not seriously change the conclusion. The original spelling alone is given.

1. Acer pensylvanicum L. Sp. Pl. 1055 (1753).
2. Anemone pensylvanica L. Mant. 247 (1771).
3. Avena (now *Trisetum*) pensylvanica L. Sp. Pl. 79 (1753).
4. Cardamine pensylvanica Muhl. ex Willd. Sp. Pl. iii. 482 (1801).
5. Carex Pensylvanica Lam. Encyc. iii. 388 (1789).
6. Fraxinus pennsylvanica Marsh. Arbust. 51 (1785).
7. Myrica pensylvanica or pensilvanica Loisel. in Nouv. Duhamel, ii. 190, t. 55 (1802), the first spelling validated by Chevalier, Mon. Myric. 182 (1901).
8. Parietaria pensylvanica Muhl. ex Willd. Sp. Pl. iv. 955 (1806).
9. Polygonum pensylvanicum L. Sp. Pl. 362 (1753).
10. Potamogeton pensylvanicus Willd. ex Cham. & Schlecht. in Linnaea, ii. 227 (1827).

11. Potentilla pensylvanica L. Mant. i. 76 (1767).
12. Prunus Pensylvanica L. f. Suppl. 252 (1781).
13. Ranunculus Pensylvanicus L. f. Suppl. 272 (1781).
14. Saxifraga pensylvanica L. Sp. Pl. 399 (1753).
15. Silene pensylvanica Michx. Fl. Bor.-Am. i. 273 (1803).
16. Vaccinium Pensilvanicum Lam. Encycl. i. 74 (1783).

In 15 out of the 16 cases (only *Fraxinus pennsylvanica* diverging), it will be noted, only a single n was used; in other words, a current spelling of the period was followed. Those who appeal to have the spelling standardized would hardly change the specific epithet *upsaliensis* simply because it is the temporary or at least recent fashion to change the long familiar name Upsala to Uppsala. In two cases, *Myrica* and *Vaccinium,* the spelling *pensilvanica* (or *um*) was originally used, but these cases need not cause trouble. Loiseleur-Deslongchamps wavered between *Myrica pensylvanica* and *M. pensilvanica* and Chevalier, in his monograph of the group, selected (and thus validated) the more usual spelling. As to the *Vaccinium, V. Pensilvanicum* Lam. (1783) is antedated by *V. Pensylvanica* Mill. (1768) and, under existing rules, automatically goes into oblivion. The spelling *pensylvanicus,* as a maintained specific name, thus has right-of-way, except in the single case of *Fraxinus pennsylvanica* Marsh. Would those who want standardization wish to alter that?—M. L. Fernald.

Potamogeton Hillii in Berkshire County, Massachusetts.—On July 30, 1939, I made a short excursion to a small pond at South Egremont, Massachusetts, and found great masses of the linear-leaved *Potamogeton Hillii* Morong growing in the slow streams which feed this most fascinating pool. Associated with it were the common *P. natans, Najas flexilis,* and a species of *Chara.* Both Potamogetons were fruiting heavily. This is the first Massachusetts record for *P. Hillii,* but by reason of its occurrence in neighboring Connecticut and New York, it was to be expected sooner or later in Berkshire County. Specimens, no. 1626 in my personal herbarium, have been sent to Gray Herbarium and are to be found in the herbarium at Iowa State College.—William A. Weber, Iowa State College, Ames, Iowa.

Rafinesque Types in the Group of Acalypha virginica.—Undoubtedly the best set of Rafinesque specimens in existence is at Geneva. A letter of De Candolle, there preserved, states that he had received, at the time of writing, eight cases of dried plants from Rafinesque; and there may, of course, have been others. Apparently, De Candolle did not keep them in his own collection; at least, all the sheets of *Acalypha* I could find are in the Delessert Herbarium, where, through the kindness of Professor Hochreutiner, I was permitted, last summer, to search for such as might throw light on the identity of Rafinesque's species in the group of *A. virginica,* a revision of which I published in 1927.[1]

The specimens found do not place all of Rafinesque's names, but, so far as they go, they are reassuring. There are five in all. They show that he applied the name *A. virginica* to *A. gracilens* Gray; one of his two sheets of that species is so labelled. Gray's name, therefore, is not threatened. There are two specimens of *A. rhomboidea,* labelled by Rafinesque himself with an epithet slightly different from *rhomboidea* as published, but with the same meaning, and quite certainly representing that species. One is from Arkansas, one from South Carolina. Both are small-leaved phases, and the former also has unusually long-stalked staminate spikes; but they can be matched in any considerable series of specimens and in technical characters both unquestionably belong with *A. virginica* var. α Muell. Arg., *A. rhomboidea* of my latest treatment. My use of the latter name is confirmed. I should designate the South Carolina specimen as type since it more nearly approximates the usual conditions in the species.

There is a third specimen, of large-leaved *A. rhomboidea,* named to genus only. This may represent *A. urticifolia* Raf. New Fl. i. 45 (1836). If so, it is not my *A. rhomboidea,* var. *Deamii,* as I had feared might be the case, and that name also stands clear.

There is nothing to represent either *A. digyneia,* which presumably rests wholly on Robin's description, or the three other North American species, which must remain of dubious identity.—C. A. Weatherby, Gray Herbarium.

[1] Rhodora, xxix. 193–204 (1927); also Rhodora, xl. 14–16 (1938).

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PLANTS NEW TO OR PREVIOUSLY UNREPORTED FROM MISSOURI

Julian A. Steyermark

As a result of continued exploration of Missouri by the writer during 1938 and 1939, many species, new to or previously unrecorded from the state, have been added to the flora. A number of them show considerable extensions of range, while some are additions to Gray's Manual.

All specimens mentioned below may be found in the Herbarium of Field Museum of Natural History.

Dryopteris Clintoniana (D. C. Eaton) Dowell, var. australis Wherry. Around outlet of Blue Spring, tributary to Big Barren Creek, T25N, R1W, Sect. 14, 10 mi. northwest of Bennett, Carter County, May 22, 1938, *J. A. Steyermark 5333.*

According to Mr. C. A. Weatherby of the Gray Herbarium, the fern may be tentatively referred to this status until there has been more collecting of this particular group of ferns in the South.

If one attempts to key out this specimen according to Small's Ferns of the Southeastern States,[1] he might place it in the category *Dryopteris celsa* (W. Palmer) Knowlton, Palmer & Pollard, on account of the slight and gradual amount of dimorphism between sterile and fertile fronds and the narrowly or broadly lanceolate outline of the leaf-blades with appressed teeth on the segments. However, *Dryopteris celsa* is known only from the coastal plain and adjacent Piedmont region. Otherwise, the fern might fit into *Dryopteris Clintoniana* var. *australis* (*D. australis*), except for the fact that it does not have the

[1] Small, J. K., Ferns of the Southeastern States, pp. 261–262. Lancaster, Pa. 1938.

conspicuously dimorphic sterile and fertile fronds which are supposed to characterize that species.

Until more material from the southern states has accumulated for comparison, there is no means of knowing how much variation occurs in the dimorphism of the sterile and fertile fronds, and, therefore, how trustworthy this character is.

This is the first record for Missouri of the occurrence of this group of ferns related to *Dryopteris Clintoniana.*

Scirpus campestris Britton, var. paludosus (A. Nelson) Fern. Wet swaly ground bordering salt spring and spring branch of Elk Lick Spring, in valley of Heath's Creek, Sect. 17, 3 mi. southwest of Ridge Prairie, Saline County, Oct. 6, 1938, *J. A. Steyermark 21587.*

Carex Woodii Dewey. Swampy meadow along spring branch along Bennett Bayou, Sect. 30, 5. mi. south of Caulfield, Howell County, April 29, 1938, *J. A. Steyermark 5237.*

This species has been recorded by Mackenzie for Missouri in North American Flora, but this is the first specimen the writer has seen. Dr. F. J. Hermann identified the specimen.

Lemna minima Philippi. Margin of Tupelo Gum Pond, Irish Wilderness, Sect. 4, Oregon County, May 23, 1938, *J. A. Steyermark 5365;* sink-hole pond, between Moody and South Fork, Sect. 7, 2 mi. south of South Fork, Howell County, April 28, 1938, *J. A. Steyermark 5222.* These specimens were identified by Dr. Lawrence E. Hicks.

Tradescantia canaliculata Raf. × T. ozarkana Anderson & Woodson. Wooded slopes of limestone bluffs along White River, west of Big Cedar Hollow, Sect. 13, 4 mi. south of Ocie, 6 mi. southeast of Protem, Taney County, April 30, 1938, *J. A. Steyermark 5267* and *5268;* limestone bluffs at entrance to Patsy Holly, tributary to Little North Fork of White River, T22N, R15W, Sect. 31 and 32, 2½ mi. south of Theodosia, Ozark County, June 11, 1939, *J. A. Steyermark 27091.*

This is the first recorded occurrence of this hybrid. Both the parent species were growing in the immediate vicinity. The specimens had the very glaucous foliage of *T. canaliculata* but the broad leaves of *T. ozarkana.* The calyces were mostly glabrous or sparsely non-glandular-hairy as in *T. canaliculata.*

Isotria verticillata (Willd.) Raf. This rare species, previously unrecorded for the state, has been found in the Herbarium of Field Museum, collected by *Savage and Shull* from the vicinity of Poplar Bluff, Butler County.

Both species of *Isotria* are now known from Missouri.

Glinus lotoides L. This member of the *Aizoaceae* has been col-

lected in several counties of western Missouri from alluvial soils. It forms flat spreading patches. Alluvial muddy shore behind zone of *Salix nigra* around Goose Lake, in bottoms of Grand River, Sect. 22, 2 miles south of Clinton, near route No. 13, Henry County, Sept. 26, 1938, *J. A. Steyermark 7483;* open exsiccated ground in black willow-buttonbush thickets, around Stultz Lake, in valley of Marmaton River, T36N, R32W, Sect. 34, 4 miles northwest of Nevada, Vernon County, Sept. 29, 1938, *J. A. Steyermark 9816;* wet open alluvial soil around end of Horseshoe Lake, in bottoms of Marais des Cygnes River, Sect. 29, 1½ miles southwest of Papinsville, Vernon County, Oct. 1, 1938, *J. A. Steyermark 9959.* Also recorded by B. F. Bush from Jackson County in correspondence to the writer.

SILENE STELLATA (L.) Ait. f., var. **scabrella** (Nieuwl.), comb. nov. *Evactoma stellata* var. *scabrella* Nieuwl.[1]

The pubescent-stemmed variety is the common type throughout Missouri and adjacent territory. One collection from Butler County, in southeastern Missouri, has glabrous or nearly glabrous stems, and may be referred to typical *Silene stellata,* which is common over the eastern portion of the range of the species.

PHILADELPHUS PUBESCENS Lois. Common on north-facing wooded limestone bluffs, ¾ mile southeast of Southwest City, McDonald County, May 31, 1938, *J. A. Steyermark 5573.*

This species of wild Mock Orange has been found in adjacent Arkansas and Oklahoma. Repeated search has been made for it in the southern Missouri Ozarks, but only recently has the writer been able to find it, and in this particular locality it is quite abundant.

HEUCHERA PARVIFLORA Bartl. var. RUGELII (Shuttlw.) Rosendahl, Butters & Lakela.

Previous collections now referred to this species had been placed in a hybrid category (*H. puberula* × *H. americana* var. *hirsuticaulis*) by Dr. Rosendahl and Dr. Butters.[2] Further collections of this species, made by the writer from the locality in Wayne County, convinced him that they belonged to the *Heuchera parviflora* var. *Rugelii* category, and subsequent study by Dr. Rosendahl served to verify this determination.

The species is found in southern Illinois and this is its first record west of the Mississippi River.

The latest collection made by the writer is from crevices of limestone bluffs, Hall's Bluff, along St. Francis River, south of Davidson's

[1] Am. Mid. Nat. 3: 58. 1913.
[2] See Steyermark, J. A., Plants New to Missouri. RHODORA 40: 253. 1938.

Blue Spring, south of Kime, Wayne County, Sept. 1, 1938, *J. A. Steyermark 6342.*

Rosa suffulta f. alba Rehder. Swale barrens along Miami Creek, 2 miles southeast of Merwin, T41N, R33W, Sect. 13, Bates County, June 2, 1938, *J. A. Steyermark 5708.*

The white-flowered form was the common type in this locality.

Lespedeza cuneata G. Don. Field along route no. 61, 4½ miles northeast of Tanner, Scott County, Sept. 17, 1938, *J. A. Steyermark 6635.*

This species has been previously recorded as an introduction in the United States by Dr. Fernald, who found it extensively in various parts of Virginia. The Missouri record, the first from so far west, serves to show how quickly some plants may become established after a brief and recent introduction from a foreign country. The plants, with their tall, bushy, and much-branched stems, covered with crowded, dull dusky-green leaves appressed to the branches, easily stand out as distinct from any of the native American species. The pale creamy-yellow flowers have two broad purplish-rose streaks on the inside of the center at the base of the standard, and are much smaller than those of our native cream- or yellow-colored *Lespedeza capitata* or *Lespedeza hirta.*

Lathyrus latifolius L. Prairie swale along railroad tracks, along route No. 63, in valley, 6 miles north of West Plains, Howell County, June 11, 1939, *J. A. Steyermark 27031.*

The Everlasting Pea was definitely established in this locality.

Vicia dasycarpa Ten. Prairie swale along railroad, along route No. 63, in valley, 6 miles north of West Plains, Howell County, June 11, 1939, *J. A. Steyermark 27030.*

This is a rarely introduced species from Europe which has become well established at the locality in Howell County. The strongly gibbous calyx, colored bluish-purple around one end, together with the narrow purple corollas and nearly glabrous stems and leaves stamp this as a distinct and easily recognized species.

Desmodium obtusum (Muhl.) DC. × D. marilandicum (L.) DC.

Hybrid plants between these two species were found in Texas and Wright Counties. The petioles were nearly as long as those of *D. marilandicum* but the petioles and stems were as pubescent as in *D. obtusum.* Various intergradations of petiole-length, pubescence, and size and shape of leaf-blade occurred. Both parent species were growing in the immediate vicinity.

Wooded sandstone slopes in ravine tributary to Roubidoux Creek, just west and south of Plato, T32N, R12W, Sect. 2, Texas County, August 20, 1937, *J. A. Steyermark 25030;* upland cherty woods, 6 miles northeast of Manes, Wright County, August 20, 1937, *J. A. Steyermark 24995.*

Oxalis violacea L. f. albida Fassett. This pure-white-flowered form was collected on a prairie along railroad tracks along route No. 24, 2 miles northwest of Rensselaer, Ralls County, May 14, 1939, *J. A. Steyermark 22471.*

Evonymus radicans Sieb. var. acuta Rehd. Base of wooded slopes along creek in Possum Hollow, Sect. 28, 2½ miles northwest of Wappapello, Wayne County, Sept. 2, 1938, *J. A. Steyermark 6449.*

This cultivated ornamental plant was well established in this locality.

Aralia nudicaulis L. On talus of wooded limestone bluffs along Mississippi River, T56N, R3W, Sect. 12, 1 mile southeast of Ilasco, Ralls County, May 12, 1939, *J. A. Steyermark 22343;* three-fourths way up east-facing limestone bluff-slopes along Mississippi River, T55N, R3W, Sect. 18 and 20, three-quarters to one mile southeast of Ashburn, Pike County, May 13, 1939, *J. A. Steyermark 22371.*

Along the Mississippi River bluffs of northeastern Missouri in Ralls and Pike Counties this species forms large stands at the base of wooded limestone slopes. In this and nearby areas along the Mississippi it is associated with other northern relics, such as *Sambucus pubens* and *Dodecatheon amethystinum,* none of which are known anywhere else in the state.

Diospyros virginiana var. platycarpa Sarg., f. atra Sarg. Upland woods near clubhouse, on top of wooded limestone slopes along Osage River, T37N, R28W, Sect. 6, 2½ miles west of Taberville, St. Clair County, Sept. 27, 1938, *J. A. Steyermark 9614.*

So far as the writer is informed, no other collection of this form of the persimmon has been recorded since it was originally described on the basis of fruiting material from Oklahoma. It may be well, therefore, to give additional data on the tree.

The depressed-globose fruit is colored dark purple- or plum-blue and is glaucous. The skin of the fruit is firmer and tougher than that of typical *Diospyros virginiana.* Several trees were noted in this area and all had the fruit similarly colored, although in adjacent territory were normally colored specimens. The trees averaged about 6 meters tall and had leaves which were mostly pubescent on the lower surface and obtuse to subcordate at the base.

Seeds were sent to the Missouri Botanical Garden and to the Arnold Arboretum for propagative purposes.

Dodecatheon amethystinum Fassett. Shaded limestone ledges on bluffs along the Mississippi River, between Lover's Leap and Riverside Cemetery, T56N, R4W, Sect. 27, ½ mile southeast of Hannibal, Marion County, May 15, 1938, *J. A. Steyermark 5318.*

This species was originally collected from this locality by Rev. John Davis, but in order to learn whether or not the station was still extant, the writer visited the area, accompanied by Dr. Paul C. Standley. Several bluff areas along the Mississippi River were explored, including Riverview Park and Lover's Leap, but only after a diligent search on the bluffs between Lover's Leap and Riverside Cemetery was the writer able to locate the plants, of which two only were seen. The plants were growing on shaded uppermost ledges of limestone bluffs, just below the top. As is characteristic of *D. amethystinum*, no red color appeared at the base of the leaves, and the capsules, which were beginning to mature, were of a slender linear-oblong type, yellowish-brown, and of a papery texture. Moreover, the calyx-lobes were short, the umbels few-flowered, and the color of the corolla a deep rose or rose-purple. In addition, the leaves of *D. amethystinum* have a pale bluish-green or even glaucous appearance on the upper surface, and this is in marked contrast to the yellowish-green leaves of *D. Meadia.* All the characters above noted point to the recognition of *D. amethystinum* in the field as distinct from *D. Meadia.* The writer first observed typical *D. amethystinum* in the Driftless Area of Wisconsin with Dr. Fassett, and was again impressed at the Missouri locality with the distinctness of this species.

The Hannibal area is the only one in Missouri where *D. amethystinum* has been found. In this area, likewise, are found such northern relics as *Sambucus pubens* and *Aralia nudicaulis*, mingled with a large number of Ozarkian species. In fact, the Ozark element in the flora along the rugged country bordering the Mississippi River north to and somewhat beyond Hannibal, is good evidence that this portion of northeastern Missouri is a "driftless" area and that it escaped glaciation together with the Ozarks. The "driftless" nature of this area is, moreover, enhanced by the occurrence of *Dodecatheon amethystinum* which is so characteristic a species in the famous Driftless Area of Wisconsin.

Mimulus alatus Ait. f. albiflorus House. This white-flowered form was collected from alluvial woods along the Gasconade River, T40N, R9W, Sect. 15, 2½ miles northeast of Vienna, Maries County, August 29, 1937, *J. A. Steyermark 25590.*

CHELONE GLABRA L. f. TOMENTOSA (Raf.) Pennell. This form of the Turtlehead, with the leaves tomentose on the lower surface, was collected at the base of small limestone bluffs along Mill Branch, tributary to Barren Fork, Sect. 21, 4 miles west of Iberia, Miller County, Sept. 19, 1938, *J. A. Steyermark 6803.*

PENSTEMON COBAEA Nutt. Common on top of open shaly limestone outcrops on mound along Miami Creek, 2 miles southeast of Merwin, T41N, R33W, Sect. 13, Bates County, June 2, 1938, *J. A. Steyermark 5715.*

For many years it has been known that the only representative of the *Penstemon Cobaea* group in Missouri belonged to the var. *purpureus* Pennell. This variety, characterized by its rich purple color, is one of the most beautiful of all species of *Penstemon*, and is limited to the White River region of Missouri and Arkansas.

Typical and less showy *Penstemon Cobaea* Nutt., with pale purplish and white corolla, has a much larger range, being found from Nebraska to Texas. The eastern limits for this species bordering Missouri, as shown by Pennell[1] on Map 62 in his Scrophulariaceae of Eastern Temperate North America, are easternmost Kansas and southeastern Nebraska. Thus, the area in Bates County, Missouri, where the writer found typical *Penstemon Cobaea* Nutt., is a slight range-extension eastward for the species. Both the typical species and its variety may now be credited to the state, which is the only one to contain both varieties of this beautiful species.

LONICERA DIOICA L. Hanging over and near top of north-facing limestone bluffs along spring branch from Montauk Spring, Montauk State Park, Dent County, May 5, 1939, *J. A. Steyermark 22126;* on north-facing bluffs along creek tributary to Crooked Creek, Montauk State Park, Dent County, May 5, 1939, *J. A. Steyermark 22132.* Material so determined by the writer has been verified by Prof. Alfred Rehder and Mr. E. J. Palmer of the Arnold Arboretum.

For the last three years, the writer has collected material from this locality, but each time was either too early or too late to obtain good flowering specimens which are so essential in this group for certain determination. Altogether six different trips were made to Montauk State Park in vain, and on two of them the writer, while passing through this portion of the Ozarks at night, had to resort to collecting the material by flashlight. Three separate trips this spring finally resulted in the successful collecting of the flowers. However, the

[1] Pennell, F. W., The Scrophulariaceae of Eastern Temperate North America. Acad. Nat. Sci., Phila., Monog. 1, p. 248. 1935.

period of anthesis is so short—one week or less (typical of many vernal-flowering species)—that almost weekly trips to the area are essential for checking on the flowering.

At any rate, the corollas of the Missouri specimens above noted are strongly gibbous at the base and are greenish-yellow tinged with rose or purple color on the outside of the corolla-tube. The leaves and stems are wholly glabrous. In all these respects the plants are characteristic *Lonicera dioica.* The chief difference lies in the fact that the lower surface of the leaves on the Missouri specimens is not nearly as glaucous as in typical *L. dioica.* How much taxonomic value lies in this slight difference, cannot at present be stated, and further study may show the lack of a decided glaucous character on the lower surface of the Missouri specimens to be correlated with other differences.

Lobelia cardinalis f. alba (A. Eaton) St. John. Occurring with typical *Lobelia cardinalis* in moist places at base of north-facing limestone bluffs along Fiery Fork Creek, Sect. 3, 2½ miles southwest of Barnumtown, Camden County, Sept. 22, 1938, *J. A. Steyermark 6950;* exsiccated low meadow in valley of Mill Creek, T26N, R7E, Sect. 9, 1¾ miles southwest of Wappapello, in Butler County, August 29, 1938, *J. A. Steyermark 6254.*

Aster Drummondii Lindl. × A. cordifolius L.

Specimens referred to this hybrid category were collected in Jefferson and Atchison Counties. In these plants the leaves were cordate as in *A. cordifolius,* but the stems, petioles, and lower surface of the leaves were covered with a short pubescence characteristic of *A. Drummondii.* Both the parent species occurred in the immediate vicinity.

Erigeron ramosus (Walt.) BSP. f. discoideus (Robbins) Fern. Collected in Vernon, Bates, Carroll, and Benton Counties. Open places along roadside, 2 miles northwest of Lamar, Vernon County, June 1, 1938, *J. A. Steyermark 5630;* cherty slopes above limestone bluffs along Osage River, T40N, R23W, Sect. 13, 2½ miles west of Warsaw, Benton County, June 3, 1938, *J. A. Steyermark 5780;* shale openings in oak-hickory woods, bordering valley of 'Tater Creek, 2 miles north of Coloma, T55N, R24W, Sect. 25, Carroll County, June 25, 1938, *J. A. Steyermark 6167.*

In all cases noted, the rayless form was growing with the species.

Lapsana communis L. On shaded gravelly banks along Jack's Fork of Current River, around bridge over route No. 17, Sect. 36, 5½ miles southeast of Arroll, Texas County, June 23, 1939, *J. A. Steyermark 27168.*

Plants belonging to this species were well established in this locality and had spread over a radius of a few hundred feet.

Field Museum of Natural History
Chicago, Illinois.

SPERGULARIA IN NORTH AND SOUTH AMERICA

Ruth P. Rossbach

(*Continued from page 83*)

7. S. rubra (L.) J. & C. Presl (Plate 589, figs. 6a–6c). Annual or short-lived perennial: *caudex* simple, bearing 3–∞ diffuse or prostrate stems which in turn may branch several times, 3–33 cm. long; *internodes of stem below the inflorescence* slender, glabrous, rarely sparsely glandular-pubescent, 2–35 mm. long, 0.5 mm. or less in diameter: *leaves* fascicled, linear-filiform, strongly mucronate, scarcely fleshy, 3.5–25 mm. long, 0.4–1.2 mm. wide, usually glabrous, or sometimes glandular-pubescent: *stipules* conspicuous, triangular-acuminate, usually shining, but sometimes dull, white or reddish, 2.5–5 mm., usually 3.5–5 mm. long: *inflorescence* a leafy, many-flowered cyme with *internodes* usually sparsely glandular-pubescent, not markedly differentiated from the lower parts of the stem; *bracts* duplicating leaves at the lower nodes, often smaller at the upper, sometimes only 2 mm. long: *sepals* lanceolate, usually glandular-pubescent, often densely so, 3.5–5 mm., usually 4–4.5 mm. long; *petals* pink, ovate, 2.4–3.8 mm. long, always shorter than the sepals; *stamens* 6–10, usually 10 but when less in number aborted ones are often present; *styles* 3, 0.6–0.8 mm. long, divided to base; *mature capsules* 3.5–5 mm. long, equaling the calyx: *fruiting pedicels* filiform, glandular-pubescent, reflexed or not, the lower 3.5–13 mm. long: *seeds* dark brown, rounded or if crowded in the capsule, truncate at the summit and angular in outline, deeply sculptured in closely interwoven, vermiform pattern with minute, dark, hard papillae scattered over the surface, most numerous on and often confined to the swollen rim, 0.4–0.6 mm. long, not winged.—Fl. Čechica, 94 (1819); C. Presl, Fl. Sic. 160 (1826); Gray, Man. 65 (1848), also through ed. 4., and Gen. ii. 28, pl. 108 (1849); Torrey, Pacific R. R. Report—Botany, iv. 70 (1857), probably not as to plants described (Corte Madera collection was of *S. media* and *S. macrotheca, q. v.*);[1] Syme, English Bot. ed. 3. ii. 129, pl. 254 (1873), good figure; Torrey, Wilkes Explor. Exped. xvii, Botany, 247 (1874), probably not at all as to plants described, which include a mixture of presumably all the common species of the Pacific coast; Chapman, Fl. So. U. S. ed. 2, 48 (1884), not as to plants described which are *S. marina, q. v.;* Robins. in Proc. Am. Acad. xxix. 309 (1894); Robins. in

[1] Martinez collection has not been found.

Gray, Synop. Fl. i. 250 (1897); Arech. in Anal. Mus. Nac. Montevideo, iii. (Fl. Uruguay) i. 91 (1901), though probably not as to plants described; Robins. & Fernald in Gray, Man. ed. 7, 378 (1908); Henry, Fl. So. Br. Columbia & Vancouver Island, 118 (1915); Rydberg, Fl. Prair. & Plains, 322, fig. 205 (1932); St. John, Fl. Se. Wash. and Adjac. Idaho, 144 (1937). *Arenaria rubra* L. Sp. Pl. i. 423 (1753) and Fl. Suec., ed. 2. 152 (1755); Smith, Eng. Bot. xii. 852 and fig. (1801), figure poor; Fries, Fl. Hall. 76 (1818);[1] DC. Prod. i. 401 (1824); Torrey, Fl. N. and Mid. U. S. 456 (1824); Cham. & Schlecht. in Linnaea, i. 53 (1826), probably not as to plants described which are a mixture of species made insufficiently clear to separate; Hooker, Fl. Bor.-Am. i. 98 (1830), including only the *Scouler* collection, excluding the collection "Canada, *Mrs. Percival*" which is *S. canadensis*;[2] Hooker & Arnott, Bot. Beechey Voy. 11 (1830), not as to plants discussed, for they refer to Cham. & Schlecht. l. c.; Bigelow, Fl. Bost., ed. 3, 191 (1840); Hooker & Arnott, Bot. Beechey Voy. 325 (1840), only in part as to plants, but references deal with mixtures of species. *Alsine rubra* (L.) Crantz, Inst. ii. 407 (1766),[3] excluding β.; C. A. Mey. Verz. Pfl. Cauc. 217 (1831); Webb & Berth. Phyt. Canar. i. 148 (1840); House in Am. Midl. Nat. vii. 133 (1921). *Arenaria campestris* Allioni, Fl. Pedem. ii. 114 (1785), Linnaean phrase-name quoted.[4] *Stipularia rubra* (L.) Haworth, Syn. Pl. Succ. 103 (1812). *Lepigonum rubrum* (L.) Wahlb. Fl. Gothob. 45 (1820); Koch, Syn. Fl. Germ. et Helv. ed. 2, i. 121 (1843); Wimm. Fl. Schles. ed. Goepp. i. 78 (1844); Kindb. Synop. Lepig. 5 (1856) and Mon. Lepig. 40, t. iii, fig. 29 (1863), figure good; Wats. Smithson. Misc. Coll. no. 258 (Bibl. Index), 103 (1878). *Buda rubra* (L.) Dumort. Fl. Belg. 110 (1827); Wats. & Coulter in Gray, Man. ed. 6, 89 (1889). *Melargyra rubra* Raf. Fl. Tellur. iii. 81 (1836), no reference to Linnaeus nor to anyone else, *nomen nudum*. *Spergula rubra* α Torrey & Gray, Fl. N. A. i. 175 (1838) (β is *S. marina* and γ is *S. media*). *Spergula rubra* (L.) Dietr. Syn. Pl. ii. 1598 (1840); Darby, Bot. So. States, 244 (1866), not as to plants described which are probably *S. marina*, *q. v.* *Spergula marina* Dufour ex Steud. Nom. ed. 2. ii. 617 (1841), *nomen nudum* given as a synonym of *Arenaria rubra* L. *Spergula maxima* Dufour, l. c., *nomen nudum*, given as synonym of *A. rubra* L. *Lepigonum rubrum* γ *perennans* Kindb. in Bot. Not. 10 (1858) and Mon. Lepig. 41 (1863). *Spergularia campestris* (L.) Aschers. Fl. Brandenb. i. 94 (1864);[5]

[1] This reference is given by Index Kewensis under *Lepigonum* but that combination is only implied and *Arenaria rubra* was the actual name used.

[2] The other two collections, *Dr. Richardson* and *Mr. Morrison*, have not been found in the Kew Herbarium.

[3] Does not refer to Linnaeus directly but gives the Linnaean phrase-name under *Arenaria rubra*.

[4] The epithet *campestris* here probably has its source in *Arenaria rubra* α. *campestris* L. Sp. Pl. i. 423 (1753). The citations of *A. rubra* α *campestris* by many European authors subsequent to and referring to Linnaeus are left out of the synonymy above because the identity of α *campestris* is not known (see discussion).

[5] Has its source in *Arenaria rubra* α. *campestris* L. but *S. rubra* is clearly described.

Rohrb.[1] in Mart. Fl. Bras. xiv. pt. 2, 267 (1872), not as to South American plants discussed which are probably *S. villosa, q. v.*; Rohrb.[1] in Linnaea, xxxvii. 229 (1871–73), not as to plants discussed which are *S. villosa, q. v.;* Arech. in Anal. Mus. Nac. Montevideo, iii. (Fl. Uruguay i.), 92 (1901), not as to plants discussed which probably are *S. Bocconi* or *S. villosa;* Hegi, Fl. Mit.-Eur. iii. 422, t. 108, fig. 1 (1911), figure good; Macbride, Field Mus. Nat. Hist. Pub. Bot. xiii.—Fl. Peru, pt. ii. no. 2, 631 (1937). *Spergularia rubra α campestris* (L.) Fenzl in Lebeb. Fl. Ross. ii. 167 (1844–46). *Spergularia rubra* var. *campestris* Gray, Man. ed. 5, 95 (1867), no author given for *campestris* but he probably referred to Linnaeus. *Fasciculus ruber* (L.) Dulac, Fl. Hautes-Pyr. 245 (1867). *Tissa rubra* (L.) Brandegee in Proc. Calif. Acad. ser. 2, ii. 131 (1889), collection cited not seen, though it may not be *S. rubra;* Britt. in Bull. Torr. Bot. Club, xvi. 127 (1889); Greene, Fl. Francisc. 128 (1891); K. Brandegee in Zoe, iv. 84 (1893), no authority given for *rubra* but she undoubtedly referred to Linnaeus, certainly not as to plants discussed, since *T. Clevelandi* is a synonym for *S. villosa* although stated by Mrs. Brandegee to be *T.* "*rubra*, the perennial form"; Greene, Man. Bot. San Francisc. Bay, 36 (1894); Reiche, Fl. Chile, i. 196 (1896); Britt. & Brown, Illus. Fl. ii. 37, fig. 1516 (1897); Howell, Fl. Nw. Coast, 89 (1903); Piper, Contrib. U. S. Nat. Herb. xi. (Fl. State Wash.) 263 (1906); Piper & Beattie, Fl. Se. Wash. & Adjac. Idaho, 97 (1914) and Fl. Nw. Coast, 145 (1915); Wooton & Standley, Contrib. U. S. Nat. Herb. xix. (Fl. New Mex.) 235 (1915); Rydberg, Fl. Rocky Mts. 279 (1917), also ed. 2 (1922); Tidestrom, Contrib. U. S. Nat. Herb. xxv. (Fl. Utah and Nevada) 197 (1925). *Tissa campestris* (L.) Prantl in Engler & Prantl, Naturl. Pflanzenfam. iii. 1b, 85 (1889). *Corion rubrum* (L.) N. E. Brown in Syme, Eng. Bot. ed. 3. Suppl. 48 (1891). *Tissa rubra* var. *perennans* (Kindb.) Greene, Pitt. ii. 229 (1892); Jepson, Fl. W. Mid. Calif. 170 (1901); Piper, Contrib. U. S. Nat. Herb. xi (Fl. State Wash.) 264 (1906). *Spergularia rubra* var. *perennans* (Kindb.) Robins. in Gray, Synop. Fl. N. Am. i. 250 (1897); Jepson, Fl. Calif. 494 (1914) and Man. Fl. Pl. Calif. 360 (1923); Munz, Man. So. Calif. 163 (1935). *Buda campestris* (L.) Kuntze, Rev. Gen. iii. pt. 2, 13 (1898), at least partly, not as to plants, which are *S. villosa. Spergula campestris* (L.) Murb. in Lunds Univ. Arsskrift, xviii. no. 3. 33 (1922), in obs.—NORTH AMERICA: in sandy or gravelly soils, chiefly of roadsides, railroad tracks, and waste places. Newfoundland, south to Maryland (rarely to Alabama), westward locally to Michigan; Vancouver Island to southern California, eastward locally to Montana, Idaho, Wyoming and New Mexico. Also occurring locally in South America, in Colombia and Chile. Introduced from Europe. NEWFOUNDLAND: St. John's, *Fernald & Wiegand* 5369, July 31, 1911 (U. S., B.). ISLE ST. PIERRE: Savoyard, *Le Hors* xxv–2a, September 6, 1934 (G.). QUEBEC: Newport, Gaspé Co., *Victorin et al.* 44900, August 1, 1931

[1] I have seen no specimens marked *Spergularia campestris* by Rohrbach.

(G.). Prince Edward Island: High Bank, Kings Co., *Fernald & St. John* 11050, July 29, 1914 (G., U. S., U. C., coarse perennial). New Brunswick: Rexton, Kent Co., *Blake* 5734, September 24, 1923 (G., U. S.). Nova Scotia: sandy roads and wastes, Halifax, Halifax Co., *Macoun* 320, May 19, 1883 (U. S.). Maine: Dover, Piscataquis Co., *Fernald* 379, August 5, 1895 (G., U. S., N. E. B. C.); Biddeford Pool, York Co., *Kennedy*, July 23, 1901 (G., N. E. B. C.). New Hampshire: Carroll, Coös Co., *Pease* 12696, July 13, 1910 (N. E. B. C.); Rye, Rockingham Co., *B. L. Robinson* 702, June 14, 1903 (G., N. E. B. C., a large perennial). Vermont: Mt. Holly, Rutland Co., *W. W. Eggleston* 148, July 8, 1898 (G., N. E. B. C.). Massachusetts: Sharon, Norfolk Co., *Poole* 86, August 1896 (G.); Oak Bluffs, Martha's Vineyard Island, *Seymour* 1198, June 28, 1916 (G., N. E. B. C., U. S.). Rhode Island: Westerly, Washington Co., *Woodward*, July 20, 1917 (G.); Old Harbour, Block Is., Newport Co., *Fernald, Hunnewell, and Long* 9471, August 21, 1913 (G., N. E. B. C., a large, short-noded plant). Connecticut: Winsted, Litchfield Co., *Blewitt* 654, June 30, 1909 (N. E. B. C.). New York: Brooklyn, *Heuser*, August 25, 1893 (B.). New Jersey: West New York, Hudson Co., *Van Sickle*, June 10, 1895 (U. S.); Scotts, Middlesex Co., *Mackenzie*, May 28, 1922 (G.). Pennsylvania: between Churchtown Road and Beartown, Lancaster Co., *Heller* 508, September 6, 1892 (G., U. S.). Maryland: near Baltimore, *J. D. Smith*, May 9, 1878 (U. S.). District of Columbia: Washington, *A. Ruth* 205, May 25, 1912 (Cal. Acad.). Alabama: in saline sand on shore, Westfowl River, *C. Mohr*, June, 1870 (D. S.). Michigan: near Litchfield, Hillsdale Co., *W. T. Wallace*, July 7, 1896 (G.). Idaho: Moscow Mts., Latah Co., *Eastwood & Howell* 3172, June 24, 1936 (G., Cal. Acad.); Santianne Creek Bottoms, Kootenai Co., *Leiberg* 1029, June 24, 1895 (U. C., Ore., Pom.); Clearwater R. between Lewiston and Lapwai, Nez Perces Co., *G. B. & R. P. Rossbach* 309, July 26, 1936 (G.). Wyoming: Old Faithful, Yellowstone Nat. Park, *P. H. Hawkins* 521c, July 2–7, 1922 (U. S., scrubby with short internodes); Norris Geyser Basin, Yellowstone Nat. Park, *E. A. Mearns* 3153, August 10, 1902 (U. S., D. S., a very large plant, typical of what Kindberg and Greene meant by var. *perennans*). New Mexico: Albuquerque, *C. L. Herrick*, September 25, 1894 (U. S.). Montana: Granite, Granite Co., *F. D. Kelsey*, July 15, 1892 (D. S., Pom.). California: Upland, Riverside Co., *I. M. Johnston* 117, May 6, 1917 (U. C., D. S., Pom.); Pacific Grove, Monterey Co., *C. Dudley*, August, 1926 (Cal. Acad., a scrubby short-noded plant); Wanona, Mariposa Co., *J. T. Howell* 365, June 2, 1924 (Cal. Acad.); San Francisco, *Greene*, April 22, 1891 (U. S., Notre Dame, U. C., cited by Greene in Pitt. ii. 229 as basis for his var. *perennans* and, although a coarse perennial, not larger than is characteristic for *S. rubra*); Metcalf's Ranch, near Mt. Eddy, Siskiyou Co., *Heller* 12126, July 18, 1915 (G., Cal. Acad., D. S.). Oregon: Siskiyou, Jackson Co., *Eggleston* 11507, August 6–7, 1915 (U. S.);

Seal Rock, Lincoln Co., *M. E. Peck* 10550, August 15, 1921 (D. S.); Sisters, Crook Co., *Roxana S. Ferris & Rena Duthie* 547, June 27, 1919 (D. S.); Lower Albina, Portland, Multnomah Co., *E. P. Sheldon* S.10316, May 12, 1902 (G., U. S., Ore., D. S., Pom.). Washington: Columbia River, w. Klickitat Co., *Suksdorf* 2081 (G., U. S., U. C., D. S.); Satsop, Chehalis Co., *A. A. & E. G. Heller* 4026, July 8, 1898 (G., U. S., U. C., B.); Lake Crescent, Clallam Co., *Geo. N. Jones* 3593, August, 1931 (W.); near Friday Harbor, San Juan Island, *N. K. Berg* 7, Sept. 28, 1904 (D. S.). British Columbia: Victoria, Vancouver Island, *C. F. Newcombe*, May 28, 1912 (Newcombe). Mexico: San Luis Potosí, *Schaffner* 1371b, 1876 (G.). Colombia: Bogota, *Perez Arbelaez* 1198, August, 1931 (U. S.). Chile: Prov. Concepcion: Dept. Concepcion, Concepcion, *Claude-Joseph* 4940, November 19, 1927 (U. S.); Penco, Bahia de Concepcion, *Barros* 279, November 6, 1937 (G.). Prov. Bio-Bio: Dept. Traiquen: Puren, *Claude-Joseph* 5926, January, 1929 (U. S.). Prov. Cautin: Dept. Imperial: Riberas de Cholchol, *Montero* 2010, November 30, 1934 (G.). Prov. Valdivia: Dept. Valdivia: Corral, *Claude-Joseph* 3268, November 11, 1925 (U. S.).

In general habit *S. rubra* varies from small prostrate plants with short internodes, forming a turfy mat, to large, slender-stemmed, diffuse plants with very long internodes. Since all other characters, such as type of stipule, sepal, capsule, and seed are ever constant, these general habit-differences, which are probably due to ecological conditions, do not warrant any special recognition. Var. *perennans*, described by Kindberg from Sweden as a perennial with very long stems, and later taken up by Greene, Robinson, Jepson, and others, differs from the species in none of the fundamental characters. Large perennials with either long or short internodes can be found anywhere within the range and probably are perennial because of favorable conditions.

In the Linnaean Herbarium there are two specimens under *Arenaria rubra*. One is marked *rubra* and with the number 6 which is the number of the species under *Arenaria* in Sp. Pl. i. 423 (1753). The plant agrees exactly in all characters with the species under discussion. This plant, labeled 6. *rubra*, is, then, the type specimen of *Arenaria rubra* L.[1]

The other sheet[1] filed under *rubra* is marked only by the number 6. and a sign Θ, meaning Hasselquist. There is no name or other inscription upon the sheet. The plant is stouter than the last, with deltoid, shorter, non-lacerate stipules, more fleshy leaves and larger

[1] Photograph in Gray Herbarium through the courtesy of Mr. C. A. Weatherby.

capsules protruding beyond the calyx. Since there are no seeds present on the plant, one does not dare to say exactly what it is but it surely resembles *S. marina*. Whether this was incorrectly thought to belong to *Arenaria rubra*, or is the type of *α. campestris* or of *β. marina* no one can now say. *β. marina* L. does not need this specimen as type for there are others which are probably the basis for this variety which has its origin in L., Hort. Cliff. (see discussion of *S. marina*).

This brings up the question of the identity of *Arenaria rubra α. campestris* L. As is shown above, probably no type of *α. campestris* exists in the Linnaean Herbarium. The fact that Linnaeus says in Sp. Pl. i. 424 (1753) under *Arenaria rubra*,

> "*Habitat α. in* Europae *arenosis collibus, β. in litoribus marinis. Stamina in campestri certe* 10 *sunt; in maritima prope Aboam stamina tantum 5 observavit D. Kalm*",

shows that he was comparing only two entities, and not three. He presumably considered *α. campestris* and *β. marina* as two parts of a composite species and therefore *α. campestris* is that part of *A. rubra* which is not *β. marina*.

8. S. Bocconi (Scheele) Foucaud (Plate 589, figs. 7a–7c). Annual: *caudex* bearing 1–many diffuse, much branched stems 5–30 cm. high; *internodes of stem below the inflorescence* usually glabrous, the upper occasionally glandular-pubescent, 6–33 cm. long, 0.8–1.6 mm. in diameter: *leaves not fascicled* or only slightly so, mucronate, fleshy, 10–45 mm. long, 0.4–1 mm. wide, usually glabrous, occasionally glandular-pubescent above; *stipules* deltoid, 2–4 mm. long, *dull white, scarcely acuminate: inflorescence* sometimes a lax cyme but more often densely filled with many short-pedicelled flowers giving a crowded appearance; *internodes* glandular-pubescent, the lowest 5–25 mm. long and 0.4–0.8 mm. in diameter; *bracts* foliaceous and glabrous below, minute and glandular-pubescent above, 1–30 mm. long: *sepals* ovate, glandular-pubescent, 2.4–5.4 mm. long; *petals* white, pink or rosy, 1.6–3.2 mm. long, as much as 0.4–1.2 mm. shorter than the calyx; *stamens* 6–10; *styles* 3, separated to the base, 0.4–0.6 mm. long: *mature capsules* 2.8–5.4 mm. long, equal to or as much as 1 mm. longer than the calyx: *fruiting pedicels* filiform, glandular-pubescent, usually not reflexed, the lowest 4–23 mm., usually 4–12 mm. long, the upper mostly much shorter: *seeds light brown, often silver-tinged, usually very plump with a broad, swollen rim, surface irregularly reticulated or roughened, minutely glandular-papillate,* 0.4–0.6 mm. long, *not winged.*—Foucaud ex Merino in Mem. Soc. Esp. Hist. Nat. ii. 496 (1904). *Alsine Bocconi* Scheele in Flora, xxvi. 431 (1843).[1] *Lepigonum diandrum*

[1] Scheele gives a reference to *Arenaria Bocconi* Soleirol, which was previously pub-

sensu Kindb. Synop. Lepig. 7 (1856),[1] non *Arenaria diandra* Guss. (1827). *L. campestre* Kindb. Mon. Lepig. 35, t. iii. fig. 23 (1863). *Spergularia atheniensis* Aschers. in Schweinfurth, Beitr. Fl. Aethiop. 305 (1867).[2] *S. campestris* (Kindb.) Nym. Consp. 123 (1878), non *S. campestris* (L.) Aschers. Fl. Prov. Brandenb. 94 (1864), which has its source in *Arenaria rubra α. campestris* L. (1753). *Tissa luteola* Greene, Pitt. v. 114 (1903). *Corion atheniense* (Aschers.) Merino, Fl. Galic. i. 519 (1905). *Alsine atheniensis* (Aschers.) Druce in Proc. Linn. Soc. 77 (1907). *Alsine luteola* (Greene) House in Am. Midl. Nat. vii. 134 (1921).—North and South America: introduced from the Old World to the Pacific coast of North America from California to Oregon and in a few of the largest cities of temperate South America. California: San Fernando, Los Angeles Co., *Abrams* 6606, July 7, 1917 (D. S.); Avalon, Santa Catalina Island, Los Angeles Co., *John I. Carlson*, June 13, 1915 (Cal. Acad.); back dunes, Surf, Santa Barbara Co., *Munz* 11381, May 17, 1929 (G., Pom.); Pacific Grove, Monterey Co., *Heller* 6797, May 28, 1903 (Notre Dame, G., U. S., Ore., D. S., Pom., U. C., type collection of *Tissa luteola* Greene); alkali country, 3 mi. sw. of Merced, Merced Co., *J. T. Howell* 1003, May 9, 1925 (Cal. Acad.); foothills west of Los Gatos, Santa Clara Co., *Heller* 7499, June 13, 1904 (G., U. S., B., D. S., U. C.); Durant Ave., by cement walk, Berkeley, Alameda Co., *H. A. Walker* 603, June 7, 1907 (U. C.); San Francisco, San Francisco Co., *K. Brandegee*, June, 1889 (G., marked *S. salina* var. *sordida* Robins. Synop. Fl. N. Am.). Oregon: Lower Albina, Portland, Multnomah Co., *E. P. Sheldon* S.9932 July 21, 1902 (Ore.); ballast, Linnton, *J. C. Nelson* 702, June 17, 1916 (G., D. S.). Chile: Valparaiso, Prov. Aconcagua, *Mauricio Berth* 934, October, 1930 (G.); Concepcion, Prov. Concepcion, *Jaffuel* 2912, December, 1931 (G.); Concepcion, Prov. Concepcion, *Claude-Joseph* 3901 (U. S.). Argentina: Alrededores de La Plata, Las Talas, Prov. Buenos Aires, *Cabrera* 1825, November 1, 1931 (La Plata); without indicated locality, *Hicken* 480 (G., Cal. Acad.). Uruguay: Pocitos-Malvin, Montevideo, *Herter* 70449, June, 1924 (B.); Montevideo, *Sello* 2295d (B., one marked *L. rubrum* by Kindb., 1861); ad margine viarum, Montevideo, *Gibert* 990 (K.); without indicated locality, *Gibert* 169, July, 1868 (K.).

S. Bocconi thrives in ballast and along sidewalks and roadsides. It is easily distinguished from *S. rubra* by its shorter stipules, more fleshy, not densely fascicled leaves, and its smaller seeds. It is

lished by Steudel, Nom. ed. 2. i. 123, 125 (1840), as a synonym, without description, for *Arenaria media* and which has its source in an herbarium name.

[1] Although the description is insufficient to indicate whether Kindberg was really describing the same plant as Gussone (1827), the situation is cleared by Kindberg in Mon. Lepig. 35 (1863) where he cites this reference as synonymous with *L. campestre*, which undoubtedly is the plant under discussion here.

[2] *Spergularia atheniensis* Aschers. has its source in an herbarium name, *Spergularia rubra* β. *atheniensis* Heldr. & Sart. published as a synonym of *Lepigonum campestre* by Kindberg, Mon. Lepig. 35 (1863).

quickly separated from *S. marina* by its smaller capsules and smaller, silvery-tinged seeds.

9. S. canadensis (Pers.) G. Don (Plate 589, figs. 2a–2d and map 6). Annual: with 1–many, *prostrate or decumbent, widely branching stems* 3–25 cm. long; *internodes of stem below the inflorescence* glabrous, 3–25 mm. long, 0.4–1.4 mm. in diameter: *leaves* linear, fleshy, blunt, not mucronate, glabrous, 6–45 mm. long, 0.6–2 mm. broad; *stipules deltoid, as long as or shorter than broad,* 1–2.8 mm. long: *inflorescence* open, leafy, not differentiated from the lower parts of the plants; *internodes* 3–28 mm. long, 0.4–0.8 mm. in diameter; *bracts* 3–35 mm. long: *sepals ovate, blunt, always glabrous,* 2.2–3.2 mm. long; *petals* white or pink, ovate, 1.6–2.6 mm. long, occasionally equal to, usually 0.4–1 mm. shorter than the calyx; *stamens* 2–5, usually 3–4; *styles* 3, separated to the base, 0.3–0.4 mm. long: *mature capsules* 3.6–5.2 mm. long, as much as 0.8–2.6 mm. longer than the calyx or *once-and-a-half to twice the length of calyx: fruiting pedicels* filiform, usually reflexed, glabrous, rarely sparsely glandular-pubescent, 4–15 mm. long: *seeds brown, dull, rounded at the summit, surface nearly smooth or with minute and irregular reticulate thickenings,* occasionally with ridges near the point of attachment, *very often with long, delicate, glandular pubescence, especially on the swollen rim at the summit,* 0.8–1.4 mm., usually 1–1.3 mm. long, *often entirely or partially surrounded by a white, erose wing* about 0.3 mm. wide, *or not at all winged.*—Gen. Hist. Diehl. Pl. i. 426 (1831), in part as to plants, including "capsules rather globose . . . valves broad and blunt," excluding "hispid" plants which were probably *S. marina;* Robins. & Fernald in Gray, Man. ed. 7. 378 (1908); Fernald & Wiegand in Rhodora, xii. 161 (1910); J. K. Henry, Fl. So. Brit. Columb. and Vanc. Isl. 118 (1915) (the plants discussed probably belong to the variety of this species). *Arenaria rubra* β. Michx. Fl. Bor.-Amer. i. 274 (1803). *A. canadensis* Pers. Syn. i. 504 (1805), based upon the Michaux plant; Pursh, Fl. Am. Sept. i. 319 (1814); DC. Prod. i. 401 (1824); Steud. Nom. ed. 2. i. 123 (1840). *A. rubra* sensu Hook. Fl. Bor.-Am. i. 98 (1830) in part, including the references *A. canadensis* Pers. and Pursh, excluding all other references which probably belong to *S. rubra* and *S. marina,*[1] non L. (1753). *Melargyra canadensis* Raf. Fl. Tellur. iii. 81 (1836), *nomen nudum. Lepigonum canadense* Fisch. & Mey. Ind. Sem. Hort. Petrop. iii. 14 (1837), *nomen nudum. Alsine canadensis* (Pers.) Heynh. Nom. 38 (1840); House in Am. Midl. Nat. vii. 134 (1921). *Arenaria marina* sensu Bigelow, Fl. Bost. ed. 3, 191 (1840), in part, including reference *A. canadensis* Pers., non *A. rubra* var. *marina* (L.) 1753. *Spergula canadensis* (Pers.) D. Dietr. Syn. Pl. ii. 1598 (1840). *Lepigonum medium* sensu Wats. Smithson. Misc. Coll.

[1] Hooker here seemed to include all North American Spergularias under *A. rubra* L. Of the four specimens cited, Canada, *Mrs. Percival,* is *S. canadensis;* Straits of De Fuca, *Dr. Scouler,* is *S. rubra; Dr. Richardson's* & *Mr. Morrison's* collections have not been seen by the author.

No. 258.—(Bibl. Index), 103 (1878), in part, including only those synonyms referring to *S. canadensis*, excluding those referring to *S. media* and *S. marina*, non *Arenaria media* L. (1762). *Tissa salina* sensu Britt. in Bull. Torr. Bot. Club, xvi. 127 (1889), as to description, non *Spergularia salina* Presl (1819). *Buda borealis* Wats. in Wats. & Coulter in Gray, Man. ed. 6, 90 (1889). *Spergularia borealis* (Wats.) Robins. in Proc. Am. Acad. xxix. 312 (1894) and in Gray, Synop. Fl. 252 (1897). *Tissa canadensis* (Pers.) Britton in Mem. Torr. Bot. Club, v. 152 (1894); Britt. & Brown, Ill. Fl. ii. 37, fig. 1515 (1897).—North America: in mud or muddy sand of the coast near upper tide limit and often covered by water at high tide, Newfoundland and Quebec to Long Island, New York; and along the southern coast of Alaska and the Queen Charlotte Islands.[1] Newfoundland: muddy brackish shore, Savage Cove, Straits of Belle Isle, *Fernald & Long* 28148, August 29, 1925 (G.); brackish or saline strand near Isthmus Cove, Pistolet Bay, *Wiegand, Gilbert & Hotchkiss* 28147, August 5, 1925 (G.); muddy strand, Port Saunders, *Fernald & Wiegand* 3328, August 6, 1910 (G.); strand, Southeast Arm, Bonne Bay, *Fernald & Wiegand* 3330, August 31, 1910 (G., U. S.); wet brackish sand, Stephenville Crossing, Bay St. George, *Fernald & Wiegand*, 3329, August 14, 1910 (G.); damp depressions in sand and gravel, back of barrier beach, Argentia, Avalon Peninsula, *Fernald, Long & Dunbar* 26646, August 26, 1924 (G.); without definite locality, *La Pylaie* (B.). Quebec: Saguenay Co.: moist sand of seashore, Bonne Esperance, *J. A. Allen* 43, August 28, 1882 (G.); rocky shore, limestone, Ile St. Geneviève, Mingan Islands, *St. John* 90412, September 9, 1915 (G., Can.); Ile du Havre de Mingan, *Victorin & Rolland* 25544, August 22, 1926 (G.); Ile à la Chasse, *Victorin & Rolland* 18869, July 26, 1924 (G.); gravelly shore, Pointe au Maurier, Charnay, *St. John* 90413, August 26, 1915 (G., Can.); salt marsh, Petites Bergonnes, *A. S. Pease* 24096, September 8, 1934 (G.). Charlevoix Co.: vicinity of Cap à l'Aigle, *John Macoun*, August 14, 1905, 66768 & 66770 (G.), 66769 (G., U. S.); marais saumâtre à l'est de la baie, Baie Saint Paul, *Victorin, Rolland & Jacques* 34089, August 23, 1930 (G., Cal. Acad., Can.). Temiscouata Co.: Notre Dame du Portage, *Victorin* 703, August, 1914 (G.); brackish margin of St. Lawrence River, Cacouna, *Collins & Fernald* (Pl. Exsicc. Gray 209) August 31, 1904 (G., U. S., D. S., U. C., Cal. Acad., W., Can.). Kamouraska Co.: muddy shore of St. Lawrence River, Ste. Anne, *Svenson & Fassett* 1099, August 10, 1923 (G.). Rimouski Co.: salt marsh, St. Lawrence R., Bic, *Fernald & Collins* 1030, July 25 & 26, 1907 (G., Can.); prairie saumâtre au bord de la mer, Sainte-Luce, *Victorin, Rolland & Jacques* 33215, August 20, 1930 (G.); salt marsh near the wharf, Bic, *Collins & Fernald*, July 15–18, 1904 (G.). Matane Co.: shore of salt marsh near mouth of Matane R. below high tide, Matane,

[1] Perhaps this occurs also on Vancouver Island, though more collections are needed to verify this supposition.

F. F. Forbes, August 6, 1904 (G.). Gaspé Co.: salt marsh at mouth of Rivière Ste. Anne des Monts, Tourelle, *Fernald & Smith* 25718, August 29, 1923 (G., Can., Cal. Acad.). Bonaventure Co.: brackish shore, New Carlisle, *Williams & Fernald*, July 28, 1902 (G.); marais saumâtres, Carleton, *Victorin, Rolland & Jacques* 33294, August 11, 1930 (G., Cal. Acad.). Anticosti Island: Anse au Sanatorium, *Victorin* 4211, August, 1917 (G., U. S., D. S.); Rivière aux Becsies, *Victorin* 4212, August 24, 1917 (G., U. S.). Without definite locality: embouchure du fleuve St. Laurent, *André Michaux* (Paris, TYPE, photograph in G.). MAGDALEN ISLANDS: Cap aux Meules, Ile de l'Étang-du-Nord, *Victorin & Rolland* 9883, August 11, 1919 (G., U. S.) immature; wet brackish sand at the margin of a pond southwest of Étang-du-Nord village, Grindstone Island, *Fernald, Bartram, Long & St. John* 7431, July 24, 1912 (G.). PRINCE EDWARD ISLAND: Prince Co.: salt marsh, Tignish, *Fernald, Long & St. John* 7429, August 6, 1912 (G., U. S., Can., Cal. Acad.); damp brackish sand, Alberton, *Fernald & St. John* 7432, July 11, 1912 (G., Can., U. S.). Queens Co.: border of salt marsh, Bunbury, *Fernald, Long & St. John* 7428, August 28, 1912 (G.); salt marsh, Mt. Stewart, *Fernald, Bartram, Long, & St. John* 7433, July 30, 1912 (G., Can., Cal. Acad., U. C.). NEW BRUNSWICK: Gloucester Co.: brackish marsh along Middle River, Bathurst, *S. F. Blake* 5369, August 13, 1913 (G., U. S., W., Cal. Acad.); shore of Shippigan Island, Lameque, *Blake* 5538, August 26, 1913 (G., U. S.); sandy beach, Tracadie, *Blake* 5636, September 10, 1913 (G.). Northumberland Co.: beach of Miramichi Bay, Loggieville, *Blake* 5618, September 5, 1913 (G.); brackish sands, Bay du Vin Island, *Blake* 5703, September 18, 1913 (G.). Albert Co.: salt marsh, Upper New Horton, *Fassett* 2245, August 22, 1924 (G.). St. John Co.: salt marsh, Quaco, *Fassett* 2241, August 20, 1924 (G.). Charlotte Co.: salt marsh, Utopia, St. George, *Fassett* 2242, August 29, 1924 (G.); Grand Manan Island, *J. R. Churchill*, August 4, 1891 (G.). NOVA SCOTIA: Cape Breton Co.: seashore, Sydney, *C. A. Hamilton* 18299, July, 1890 (Can.). Halifax Co.: on pebbly beach, Purcell's Cove, Halifax Harbor, *Howe & Lang* 1571, September 2–6, 1901 (G.). Kings Co.: sandy shore, Starr's Point, *Fernald*, August 23, 1902 (G.). Queens Co.: damp sand flats and tidal wash, Central Port Mouton, *Graves, Long & Linder* 21181, August 16, 1920 (G.). Shelburne Co.: upper border of gravelly strand, Villagedale, *Fernald, Long & Linder* 21188, August 7, 1920 (G., Can., U. S.). Yarmouth Co.: gravelly and rocky seabeach, Lower Argyle, *Fernald, Bissell, Graves, Long & Linder* 21189, August 11, 1920 (G.). MAINE: Washington Co.: between tide marks, Eastport, *W. G. Farlow*, September, 1877 (G.); beach near Point of Main, Machiasport, *M. A. Barber*, August 24, 1898 (G.). Hancock Co.: beach at Broad Cove, Somes Sound, Mt. Desert Is., *C. E. Faxon*, September 4, 1895 (G.). Waldo Co.: sand and gravel along seashore, about at high-tide mark, west shore of 700-Acre Island, Islesboro, *G. B. Rossbach* 370, August 25,

1931 (N. E. B. C.). Cumberland Co.: salt marsh, Cumberland, *E. B. Chamberlain*, July 26, 1901 (G.); near shore, southwest part of Ragged Island, Casco Bay, *Rodney H. True*, September 4, 1921 (Penn.). York Co.: river bank, a mile from mouth, Kennebunkport, *Walter Deane*, July 12, 1894 (G.). New Hampshire: Rockingham Co.: Little Harbor, Rye, *E. F. Williams*, September 19, 1901 (G.); Hampton, *E. F. Williams*, September 22, 1901 (G.). Massachusetts: Essex Co.: Cape Ann, *J. B. Brinton*, August 2, 1884 (Cal. Acad.). Middlesex Co.: banks of Charles River, Cambridgeport, *B. L. Robinson*, September 18, 1898 (G.). Norfolk Co.: Fossil Ledge, Braintree, *Kennedy*, Nov. 30, 1888 (G.). Barnstable Co.: North Dennis, Cape Cod, *C. N. Brainerd*, July 14, 1879 (G.). Connecticut: mud flats near shore of Long Island Sound, Old Lyme, *Woodward*, July 27, 1917 (G.). New York: Centerport, *A. C. Cook*, 1887 (U. S.). British Columbia: San Juan Harbor, Vancouver Island, *Rosendahl* 2059, August 12, 1907 (G.); Tlell, Graham Is., Queen Charlotte Islands, *W. A. Newcombe*, July 24, 1925 (Newcombe). Alaska: shores of Naha Bay at Loring, *Thos. Howell* 1615, August 15, 1895 (U. S., U. C.); sands covered at high tide, Bay of Pillars, Kuiu Island, *Henderson* 14665, August 19, 1932 (Ore.); Klawak, *A. & A. Krause* 554b (B.); margin of sea in tide flats, Sitka, *Luella G. Smith* 157, August 2, 1933 (Ore.).

S. canadensis may be quickly recognized by its decumbent habit and glabrous, fleshy stems and leaves, its capsules much exceeding the blunt sepals, and usually by its very large seeds. It differs from *S. marina* in having larger seeds (which, if they are glandular-papillose, have very long papillae) more protruding capsules, usually shorter sepals, and nearly always more glabrous surfaces. It differs from the introduced *S. media* in more prostrate growth, shorter stipules, smaller flowers and capsules, 2–5 stamens instead of 9–10, shorter styles, and usually larger seeds which may be glandular-pubescent.

The geographical distribution of *S. canadensis* is interesting because it is restricted to the northeastern and northwestern coasts. It has evidently never been collected anywhere between, on the Arctic coasts, although John Macoun[1] reports a collection from James Bay by *Burgess*. This specimen has not been located at the herbarium in Ottawa but the great probability is that it would belong to *S. canadensis* because the locality would be roughly in the same latitude as the known range. However, it may have been *S. marina*. Since this species is strictly maritime, often growing just below high-tide

[1] Geol. & Nat. Hist. Survey Canada—Cat. Canad. Pl. pt. i, 80 (1883).

limits, it would not be expected in the interior. Why it does not occur on the northern coasts is hard to say; but temperature is probably one limiting factor. There are other maritime plants with very similar broken ranges, such as *Polygonum Fowleri*[1] and *Senecio Pseudo-arnica*,[2] though the latter extends along the north-eastern coasts of Asia. Professor M. L. Fernald also suggests *Coelopleurum lucidum* and *Glaux maritima* var. *obtusifolia* as having similar ranges.

10. Var. **occidentalis**, var. nov. Caulibus erectis, sparse villoso-glandulosis vel glabris: stipulis triangularibus, quam longis tam latis vel longioribus quam latis, 1.6–3.2 mm. longis: sepalis non obtusis, glabris vel villoso-glandulosis, 3–4.6 mm. longis; staminibus 2–5; stylis 3, ad basim divisis, 0.3–0.6 mm. longis: capsulis maturis 4.4–6.4 mm. longis, sepalis 0.4–2.4 mm. longioribus vel sepalis minus quam sesqui-longioribus: seminibus eis varietatis typicae similibus, quamquam vulgo 0.9–1.1 mm. longis.—North America: Along the coast from northern California to Vancouver Island. California: salt marsh, Humboldt Bay, Humboldt Co., *Rattan*, June, 1878 (G.). Oregon: brackish mud-flat, 3 miles west of Tillamook, on road to Bayocean, Tillamook Co., *G. B. & R. P. Rossbach* 642, June 22, 1938 (G.); salt marsh, Bayocean, Tillamook Co., *Henderson* 11550, July 31, 1929 (U. C.). Washington: brackish clay near mouth of Palix River, Willapa Bay, 15 miles south of Raymond, Pacific Co., *G. B. & R. P. Rossbach* 644, June 26, 1938 (G. type, D. S., U. C., U. S., W., Cal. Acad., B.); brackish clay, Willapa Bay, just north of the Palix River, about 11 miles south of Raymond, Pacific Co., *G. B. & R. P. Rossbach* 645, June 26, 1938 (G., D. S., B., Cal. Acad., U. S., Ore., W.); salt marsh, Westport, Grays Harbor Co., *H. C. Cowles* 518, July 10, 1907 (G.); on the coast, Olympic Mts., Clallam Co., *Elmer* 2746, August, 1900 (D. S., Pom., Ore.); open muddy places in salt marsh, near Blyn at head of Sequim Bay, Clallam Co., *G. B. & R. P. Rossbach* 646, July 6, 1938 (G., D. S., Cal. Acad., U. C., B., W., Ore., F. M., Pom.); muddy tidewater, northern part of Hood Canal, 1 mile north of Brinnon, Jefferson Co., *G. B. & R. P. Rossbach* 649, July 6, 1938 (G., D. S., W., Ore.); salt marsh, 8 mi. north of Eldon on the Hood Canal, Jefferson Co., *G. B. & R. P. Rossbach* 651, July 6, 1938 (G., D. S., U. S., Cal. Acad., Pom., U. C., W., Ore., B.); salt marsh at mouth of Perry Creek, 5 miles north of Olympia, Thurston Co., *G. B. & R. P. Rossbach* 652, July 6, 1938 (G., D. S., U. C., Cal. Acad., U. S., B., W., Ore.); salt marsh at Steilacoom, Pierce Co., *G. B. & R. P. Rossbach* 654, July 7, 1938 (G., D. S., Cal. Acad., U. C., U. S., W., Ore.); shores of Puget Sound at Steilacoom, Pierce Co., *J. W. Thomp-*

[1] See map 25 in Fernald, Mem. Gray Herb. ii (Persistence of Plants in Unglaciated Areas of Boreal America) (1925).

[2] See map 28 in Fernald, l. c.

son 9960, August 22, 1933 (U. C., Pom., D. S., U. S.); wet hollows in beach at high tide line, Silverdale, Kitsap Co., *I. C. Otis* 1639, June 27, 1929 (W.); Fort Lawton, Seattle, King Co., *Eastwood* 9620, June 19, 1920 (Cal. Acad.); Seattle, King Co., *Piper* 694, June 20, 1889 (W.); Bellingham Bay near Whatcom, Whatcom Co., *Suksdorf* 954, July 15, 1890 (G., U. C.); Friday Harbor, San Juan Co., *N. K. Berg* 88, July 3, 1904 (D. S.). Vancouver Island: Saanitch Inlet, *Newcombe*, September 12, 1917 (Newcombe); Esquimalt Indian Reserve, *Newcombe*, June 6, 1920 (Newcombe); Nanaimo, Discovery Bay, *Eastwood* 9870, June 26, 1920 (Cal. Acad.); vicinity of Nanaimo, *John Macoun* 78518, June 24, 1908 (Can.); Nanaimo, *John Macoun* 2761, June 10, 1887 (Can.); salt marshes, Nanoose Bay, *Carter* 508, September, 1916 (G., Newcombe); Comox, *John Macoun* 13, June 27, 1893 (Can.).

Var. *occidentalis* differs from the typical form of the species in having a more erect habit, often a more glandular pubescence, usually somewhat larger stipules and a capsule which does not so much exceed the calyx. These plants could not be called *S. marina* because of their large seeds which, if they are glandular-pubescent, have very long, slender papillae. They cannot belong to the introduced *S. media*, because the flowers and capsules are too small, the seeds sometimes pubescent, the stamens 2–5, instead of 9–10, and the styles usually too short. They are treated as a variety of *S. canadensis* because the seeds are like those of that species.

11. S. media (L.) Presl (Plate 590, figs. 1a–1c). Annual or perennial (?): *caudex* bearing 1–∞ erect or prostrate stems 5–40 cm. tall; *internodes of stem below the inflorescence* 6–30 mm. long, 1–2.2 mm. thick, usually glabrous, occasionally the upper sparsely glandular-pubescent: *leaves* in fascicles of 1–3 in the axils, occasionally not fascicled, not mucronate or with a very short mucro, 10–50 mm. long, 0.8–2 mm. wide, glabrous or sometimes the upper sparsely glandular-pubescent; *stipules* deltoid, sometimes shortly acuminate, 2.5–6 mm. long, as long as or slightly longer than broad: *inflorescence* with *internodes* 3.5–30 mm. long, 0.4–0.8 mm. thick, and foliaceous *bracts* 1–25 mm. long, the upper minute: *sepals* narrowly ovate, 2.8–6 mm. long, usually 4–5 mm., glabrous, sometimes glandular-pubescent; *petals* white, ovate, 2.5–4.5 mm. long; *stamens* 9–10; *styles* 3, divided to the base, 0.5–1 mm. long: *mature capsules* 4.5–8 mm., usually 5.5–7 mm. long, sometimes equal to the calyx or as much as 4 mm., usually 1–2.5 mm. longer than the calyx: *fruiting pedicels* reflexed or not, usually glandular-pubescent, sometimes glabrous, 4–23 mm. long: *seeds* dark brown, smooth or very slightly roughened with low elongate mounds,[1]

[1] Especially noticeable in some of the collections from Chile and Juan Fernandez Islands.

not sculptured but sometimes with delicate, vermiform traceries, 0.6–1.1 mm., usually 0.8–1 mm. long, though occasionally not winged usually surrounded by a scarious, white or brown-tinged wing somewhat erose or entire at the margin, sometimes with a brown zone next to the seed, 0.1–0.4 mm. wide.—Fl. Sic. i. 161 (1826); Gray, Man. ed. 5, 95 (1867), as to source of name but not as to description which applies to smooth-seeded plants of *S. marina;* Rohrb. in Mart. Fl. Bras. xiv, pt. 2, 272 (1872), including only 1: "Forma capsula calyce sesqui vel duplo longiore" and the synonymy given; excluding 2. "Forma capsula calycem aequante . . .", which is a mixture of *S. ramosa* and *S. villosa;* Wats. Bot. King Exp. 42 (1871), as to source of name, but collection cited, *Watson* 177, is *S. marina* with smooth seeds; Rohrb. in Linnaea, xxxvii. 242 (1871–73), including only "1. Forma genuina," excluding "2. Forma capsula calycem aequante vel vix superante." for the most part, which is a mixture of *S. media, S. ramosa, S. villosa, S. colombiana,* etc.[1] and excluding "3. Forma dense caespitosa humilis capsula calyce breviore," which is *S. villosa, q. v.;* Robins. in Gray, Synop. Fl. i. pt. i, 252 (1897); Robins. & Fernald in Gray, Man. ed. 7, 379 (1908); Vallentin & Colton, Illus. Pl. Falkl. Is. 13 (1921), figure good; Macbride, Field Mus. Pub. Bot. xiii. (Fl. Peru pt. ii.) 632 (1937), not as to plant cited which is *S. fasciculata, q. v.* *Arenaria media* L. Sp. Pl. ed. 2, 606 (1762); Pers. Synop. i. 504 (1805); DC. Prod. i. 401 (1824); Hook. & Arn. in Hooker, Bot. Misc. iii. 147 (1832), including collections by *Gillies* and *Bridges,* excluding collections by *Cruckshanks* and *Cuming* 550 which are *S. villosa, q. v.;* Gay, Fl. Chile i. 267 (1845), as to source of name, but description applies to *S. villosa, q. v.;* Hooker, Fl. Antarct. i. pt. 2, 250 (1847), including also var. β. *A. marina* sensu Smith, Eng. Bot. xiv. 958 and fig. (1802), including β (in all probability the plants described are all *S. media*), non *A. rubra* β. *marina* L. (1753). *A. marginata* DC. in Lam. & DC. Fl. France, iv. pt. 2, 793 (1805) and Ic. Pl. Gall. Rar. 15, t. 48 (1808), figure good. *A. marginata* Schlecht. in Ges. Naturfors. Freunde Berl. Mag. vii. 212 (1816), very indefinite description. *Stipularia media* (L.) Haworth, Syn. Pl. Succ. 103 (1812). *Lepigonum medium* sensu Wahlb. Fl. Gothob. 46 (1820), gives *Arenaria rubra* β. *marina* L. as a synonym,[1] non *Arenaria media* L. (1762). *L. marinum* sensu Wahlb. l. c. 47, who gives *Arenaria media* L. as a synonym,[2] non *A. rubra* β. *marina* L. (1753). *L. medium* (L.) Fries, Nov. Fl. Suec. Mant. iii. 33 (1839); Koch, Syn. Fl. Germ. ed. ii, i. 121 (1843), in part, probably a mixture of *S. marina* and *S. media;* Kindb. Synop. Lepig. 14 (1856), as to source of name but probably not at all as to plants discussed because they are placed under "microtheca" and the capsule is described

[1] Here there is such an involved mixture of species among the citations and synonyms that an explanation is not attempted. However, the references and citations may be found in their place in the monograph.

[2] Wahlberg evidently interchanged the Linnaean epithets *marina* and *media* in making his new combinations.

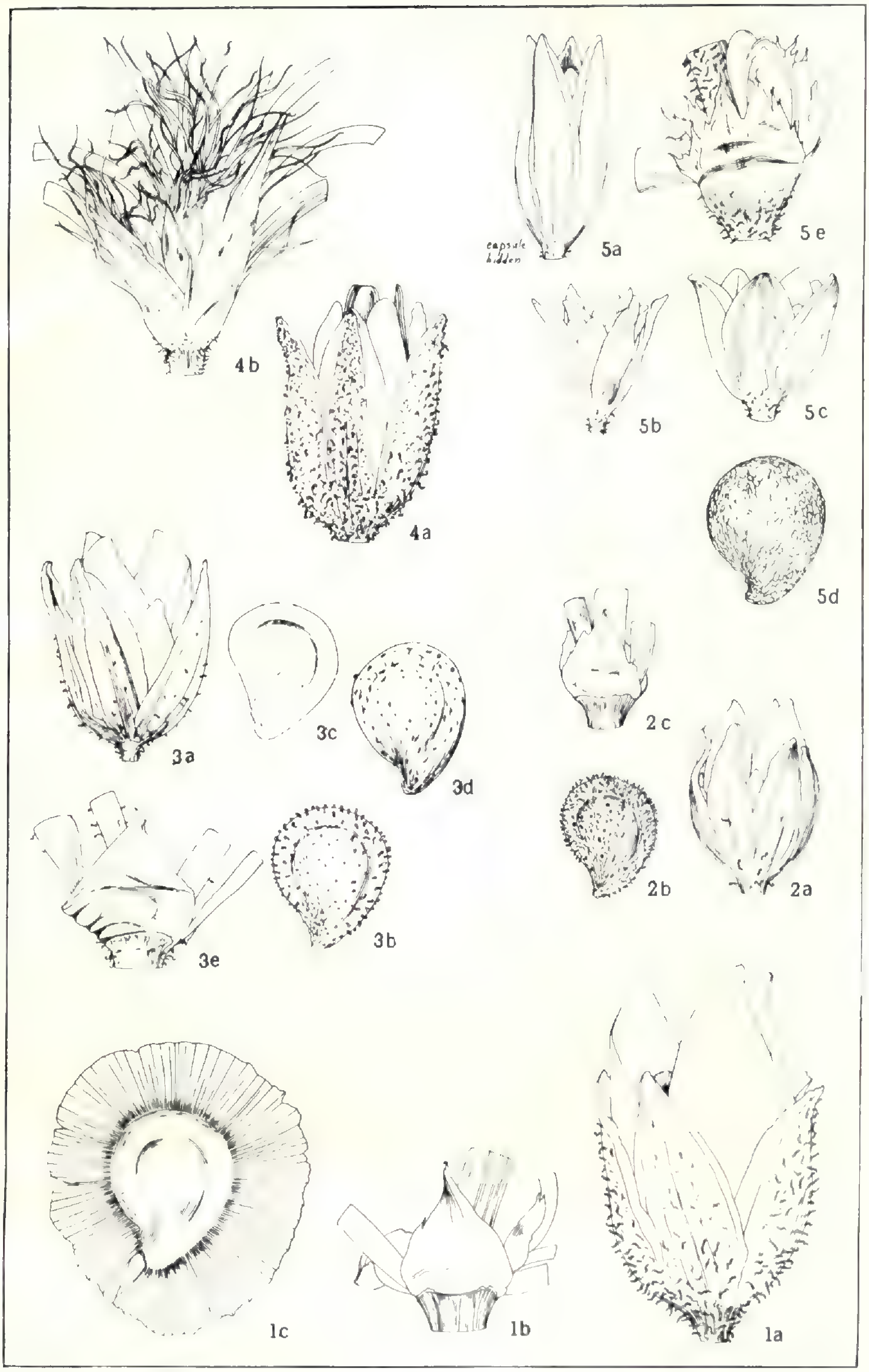
as slightly exceeding calyx, which is more characteristic of *S. marina;* Kindb. Mon. Lepig. 24, t. ii, fig. 11 (1863), *S. marina* as to plants for same reason as above; Wats. Smithson. Misc. Coll. No. 258 (Bibl. Index) 103 (1878), as to source of name and including part of the synonyms, the remaining, too numerous to take up, pertain to *S. marina* and *S. canadensis;* Brewer & Wats. Geol. Survey of Calif. ed. 2, Bot. Calif. i. 71 (1880), probably *S. marina* as to description. *Spergula media* (L.) Bartl. in Bartl. & Wendl. Beitr. Bot. ii. 64 (1825). *Alsine marina* var. β. Mert. & Koch in Roehl. Deutsch. Fl. ii. 293 (1826), with *A. media* L. as a synonym. *Buda media* (L.) Dumort. Fl. Belg. 110 (1827). *Arenaria rubra* sensu Hook. & Arn. Bot. Beechey Voy. 11 (1830),[1] non L. (1753). *Alsine marginata* (DC.) C. A. Mey. Verz. Pfl. Cauc. 217 (1831), non *A. marginata* Schreb. Spicil. Fl. Lips. 31 (1771), which is a *Spergula;* Reichenb. Fl. Germ. 566 (1832); House in Am. Midl. Nat. vii. 133 (1921). *A. marginata* Fenzl, Verbreit. Alsin. tab. ad. p. 18 (1833), *nomen nudum. Melargyra media* Raf. Fl. Tellur. iii. 81 (1836), *nomen nudum. Spergula rubra γ?* Torr. & Gray, Fl. N. A. i. 175 (1838). *Aren. marina* var. β. Bertol. Fl. Ital. iv. 685 (1839). *A. maritima* Steud. Nom. ed. 2, i. 125 (1840), founded upon a name with pre-Linnaean basis but given as a synonym for *A. media* L. *Lepigonum marginatum* (DC.) Koch, Syn. Fl. Germ. ed. 2, i. 121 (1843). *Spergularia marginata* (DC.) Kittel, Taschenb. ed. 2, 1003 (1844); Boreau, Fl. Centr. Fr. ed. 3, ii. 106 (1857); Arech. in Anal. Mus. Nac. Montevideo, iii. (Fl. Uruguay i.) 91 (1901); Fernald & Wiegand in Rhodora xii. 161 (1910). *S. media* β. *marginata* (DC.) Fenzl in Ledeb. Fl. Ross. ii. 168 (1844–46). *Lepigonum marinum* (Wahlb.) Kindb. Synop. Lepig. 12 (1856), non *Arenaria rubra* β. *marina* L. (1753). *L. marinum* sensu Kindb. Mon. Lepig. 18, t. i, fig. 6 (1863), for the most part but excluding the synonyms *S. macrocarpa* Presl, *S. rupestris* Camb., *Arenaria rubra* β. *marina* L., *Arenaria marina* All. and others, non *Arenaria rubra* β. *marina* L. (1753). *A. litoralis* Philippi in Linnaea, xxviii. 673 (1856). *Spergularia rubra* sensu Torrey, Pacific R. R. Rep.—Bot. iv. 70 (1857), including only synonyms *A. media* L. and *A. marginata* DC., part of the Corte Madera specimen being *S. media,* the other plant *S. macrotheca,*[2] non *Arenaria rubra* L. (1753). *Lepigonum marinum* subsp. *dubium* Kindb. Mon. Lepig. 21, t. i, fig. 5 (1863). *Spergularia media* var. *macrocarpa* sensu Gray, Man. ed. 5, 95 (1869), excluding synonym *S. macrocarpa* Presl which pertains to *S. ramosa,* non *S. macrocarpa* Presl (1831). *Lepigonum medium* var. *macrocarpa* sensu Wats. Smithson. Misc. Coll. no. 258 (Bibl. Index) 103 (1878), non *Spergularia macrocarpa* Presl (1831). *Corion medium* (L.) N. E. Brown in Syme, Engl. Bot. ed. 3, Suppl. 49 (1891) and in Druce, Bot. Exch. Club Brit. Isl. Rep. for 1892 (1893). *Tissa marina* sensu Greene,

[1] There is a specimen in Herb. Hooker at Kew, *Beechey,* Concepcion, mounted on a sheet of *A. media* by Hooker.

[2] I have not been able to find the Martinez collection cited here.

Fl. Francisc. 128 (1891), non *Arenaria rubra* β. *marina* L. (1753); sensu Greene, Man. Bot. San. Francisc. Bay 37 (1894), non *A. rubra* β. *marina* L. (1753). *Buda marina* sensu Macloskie, Rep. Princeton Univ. Exp. Patagonia, viii. i. pt. 5, 395 (1905), non *A. rubra* β. *marina* L. (1753). *Alsine media* (L.) Druce in Ann. Scot. Nat. Hist. 221 (1906), based upon *Arenaria media* L. (1762), non *Alsine media* L. Sp. Pl. i. 272 (1753), which is a *Stellaria*. *Tissa marginata* (DC.) Heller, Muhlenbergia, vi. 96 (1910). *Spergularia maritima*[1] Chiov. in Ann. Bot. Roma, x. 22 (1912), no description but gives *A. marginata* DC. as a synonym. *Spergularia maritima* Hill ex Druce, Rep. Bot. Exch. Cl. Brit. Isles, iii. pt. 5, 438 (1914), as synonymous of *S. media* Presl. *S. alata* Wiegand in Rhodora, xxii. 15 (1920).—North and South America: introduced from Europe in New York at Shelter Island and in saline places in the interior; in Marin Co., California and in Oregon. Also in Chile, where it may not be introduced, from Prov. Santiago south to Chiloe; on the Juan Fernandez and Falkland Islands and about ports in Argentine and Uruguay. New York: head of Coscles Inlet, Shelter Island, *House* 9694, August 15, 1923 (G.); salt pond east of Montezuma, Cayuga Co., *Metcalf & Wiegand* 6406, July 4, 1916 (G., type collection of *S. alata* Wiegand); salt flats east of village, Montezuma, *Eames, Randolph & Wiegand* 12004, September 9, 1919 (G., cited under *S. alata* by Wiegand); on island by Cayuga Bridge, *Muenscher* 16953, August 5, 1927 (G.); saline clay about salt sheds, south of Liverpool, Syracuse, Onondaga Co., *Fernald, Wiegand & Eames* 14278, August 31, 1922 (G.); salt springs, Syracuse, Onondaga Co., *E. C. Webster* (G.); salt marsh, Syracuse, Onondaga Co., *Wiegand* 27, August 18, 1902 (G.); near Baldwinsville, *Beauchamp*, 1894 (G.); salt marsh, southeast corner of Onondaga Lake, Syracuse, Onondaga Co., *Wiegand* 6409, September 14, 1916 (G.); Onondaga Lake, *Kirkwood*, July, 1903 (U. S.). California: salt flats on south side of bridge across head of Drake's Estero, Marin Co., *Ferris & Wiggins* 8117, July 19, 1935 (G.); Almonte, Marin Co., *Eastwood*, July 15, 1920 (Cal. Acad.) and same locality, *Eastwood* 10595, June 9, 1921 (Cal. Acad.); Tiburon, Marin Co., *Michener & Bioletti*, April, 1891 (G.); Almonte, Marin Co., *Sutcliffe*, May 17, 1919 (Cal. Acad.); Sausalito, *K. Brandegee*, June, 1889 (G.). Oregon: salt marsh on tide-flats, Toledo, Lincoln Co., *J. C. Nelson* 2355, July 5, 1918 (G.); on ballast, Lower Albina, Portland, Multnomah Co., *Sheldon* S.9915, July 21, 1902 (Ore.). Chile: Prov. Aconcagua: Dept. Valparaiso: on shore at port of Valparaiso, *Philippi* 70 (B.); Algarrobo, *Germain*, October, 1836 (Santiago, photo. in G., type of *Arenaria litoralis* Philippi). Prov. Santiago: Dept. Santiago: Santiago, *Claude-Joseph* 2223, December, 1922 (U. S.); Santiago, *Philippi*, 1861 (K.); Careo, Santiago, *E. C. Reed* (K.). Dept. Meli-

[1] Based upon *A. maritima* All. 87 no. 119 (1774) which is the same as *A. maritima* All. Misc. Taur. (see note under discussion of *S. marina*), which is probably based upon *A. rubra* β. *marina* L. (1753) (see discussion under *S. marina*). The name *maritima* has its source in pre-Linnaean works and is in great confusion.



SPERGULARIA: stipule, calyx and capsule × 5; seeds × 25.
S. MEDIA, figs. 1a–1c. S. ECHINOSPERMA, figs. 2a–2c. S. MARINA, figs. 3a–3e. S. CONGESTIFOLIA, figs. 4a and 4b. S. ARBUSCULA, figs. 5a–5e.

Type of ARENARIA RUBRA β. MARINA L.

Photograph of *Arenaria foliis linearibus longitudine internodiorum* of Linnaeus, Hort. Cliff., by courtesy of Mr. JOHN RAMSBOTTOM.

pilla: San Antonio, *Looser*, 1295, December 23, 1928 (G.); en terrenos arenosos terrosos, secos y asoleados de la orella del mar, Dunas, lado noete, San Antonio, *G. Montero* 232, October 16, 1927 (G.); San Antonio, *Claude-Joseph* 1765, October, 1921 (U. S.). Prov. Concepcion: Dept. Concepcion: Concepcion, *Beechey* (K., mounted on sheet of *A. media*); Concepcion, *Jaffuel* 330, January, 1912 (G.); Concepcion, *Claude-Joseph* 4086, November, 1925 (U. S.); Hualpén, *Barros* 267, December 10, 1937 (G.). Dept. Arauco: moist sand behind dunes of beach, *Pennell* 12908, March 6, 1925 (G., F. M.); Arauco, *Barros* 285, November 15, 1938 (G.). Prov. Cautin: Dept. Imperial: Saavedra?, *Hollermayer* 203, November, 1919 (B.); Budi, *Claude-Joseph* 3119, January, 1925 (U. S.). Prov. Valdivia: Dept. Valdivia: crevices of rocks within tide mark, Bay of Valdivia, *Bridges* 571 (K., mounted on sheet with *A. media*); Valdivia, *Bridges* vel *Cuming?* 256, 1862 (N. Y.); on seacoast at Corral, *Buchtien* 12968, January, 1902 (U. S.); Corral, *Philippi*, 1860 (K.); San Juan, *Gunckel* 1967, February 8, 1931 (G.); San Carlos, *Gunckel* 1988, February 15, 1931 (G.); Amargos, *Gunckel* 15114, February 18, 1930 (G.) and 1871, November 6, 1929 (G.); on the seashore to the north of the sand bar of Rio Bueno, *Hollermayer* 776, January 29, 1935 (G.). Prov. Chiloe: Dept. Ancud: sand flats behind beach, Ancud, *Pennell* 12558, February 6–7, 1925 (G.); muddy tidal flat, salt marsh, Isla de Mechuque, *Pennell* 12624, February 10, 1925 (G.), immature. Dept. Castro: Chiloe and Chonos, *E. C. Reed*, 1871 (G., K.). Chonos Archipelago: Tres Montes, *Darwin* 6, December, 1834 (K.). Without definite locality: *Philippi*, 1870 (B.); *C. Vohsenius*, 1860 (B.); mittleres Chile, *Claude-Joseph* (G.); Herb. *Link* 3, (B., marked *dubium*, *Lepigono marino* affine by Kindberg, 1861, type of *L. marinum* subsp. *dubium* Kindb.);[1] *Bridges* (B.). Juan Fernandez Islands: Masafuera: Quebrada de las Casas, near the sea, *C. & I. Skottsberg* 411, February 24, 1917 (U. S., N. Y., K., seeds small, 0.6–0.7 mm., with elongate mounds but in habit similar to the specimens from the Falkland Islands). Falkland Islands: Shallow Bay beach, W. Falkland Islands, *Vallentin*, 1909–1911 (G., K:); Falkland Islands, *Hooker f.*, 1839–1843 (G., K.). Uruguay: Montevideo, *M. Arsène Isabelle*, 1838 (F. M.). Argentina: Prov. Buenos Aires: proderas nimedas entre La Plata y Ensenada, *Cabrera* 1768, October 8, 1931 (G.); Buenos Aires, *Tweedie* (K.); Buenos Aires, *Gillies* (K., cited under *A. media* by Hooker).[2] Santa Cruz. Terr.: Port Desire, *Darwin* (K., immature).

There is a specimen correctly filed and labeled *media* in the Linnaean Herbarium,[3] which therefore can be designated as the type of *Arenaria*

[1] Mon. Lepig. 21 (1863), also cited under *Spergularia media* by Rohrb. in Linnaea, xxxvii. 242 (1871–73).

[2] Bot Misc. iii. 147 (1832).

[3] Photograph by courtesy of Mr. C. A. Weatherby is in the Gray Herbarium. I am also greatly indebted to Mr. Weatherby for careful measurements of this type.

media L. The capsules measure 8–9 mm. long and have smooth, dull, dark brown seeds 0.6–0.8 mm. long, with broad wings 0.3–0.4 mm. wide. With such large capsules the plant could not possibly belong to *S. marina.*

S. media, so often confused with *S. marina,* differs from the latter in having larger capsules, usually larger seeds which are nearly always winged, petals white instead of pink or rosy, stamens 9–10 instead of 3–5, and a stouter, more erect, more glabrous habit. *S. media* may be easily distinguished from *S. macrotheca,* which has seeds so like as often to be indistinguishable, by its more glabrous habit, more protruding capsule, less fascicled leaves, deltoid, slightly acuminate stipules instead of lanceolate, strongly acuminate larger ones, white petals, and blunt sepals.

It may be noted in the description that there is great variability in size of seed and width of wing. Most of the Californian plants have large seeds, 1–1.1 mm. long, while Chilean plants usually have small seeds, 0.7–0.9 mm. long, though occasionally as large as 1 mm. Those of New York plants measure 0.8–0.9 mm. Since European plants have all these sizes of seeds, this variability is not significant. New York seeds have broad wings, 0.3–0.4 mm. wide, and Chilean seeds have wings 0.2–0.3 mm. wide or none at all. Californian, Argentinian and European seeds show all widths of wings. There are all variations in length of capsule in relation to length of calyx in all parts of the range, including Europe. There are also all types of habit throughout the range from very short, compact plants with fleshy leaves to large, heavy, long-stemmed plants, probably depending upon the ecological conditions of the habitat. A detailed study of more complete collections of European plants may throw some light upon these variations and bring out sound taxonomic differences, especially in size and length of capsule in relation to the calyx, type of wing and size of seed.

The Chilean plants often show low, elongate mounds upon the surface of the seed, unlike any European seeds I have been able to examine. However, at present I can find no other character to support a separation of Chilean plants. I admit that this plant seems common and widespread enough in Chile possibly to be native there. The Juan Fernandez material is not typical but its habit compares well with that from the Falkland Islands, which has typical seeds. Juan Fernandez seeds are small, 0.6–0.7 mm. long, with low, elongate

swellings and very delicate, vermiform traceries on the seed-coat. These seeds agree well with those of many Chilean specimens but are a bit smaller.

S. alata, according to Wiegand, differs from *S. marginata,* which is synonymous with *S. media,* in having more glabrous stems, more foliaceous bracts, and a more erose wing to the seed. Many European collections of *S. media,* however, are entirely glabrous and most have bracts as long as, or longer than, the type of *S. alata.* Except for the wide erose wing, this latter plant agrees in every way with many widely distributed collections of *S. media* from all parts of Europe. This type of wing, furthermore, is found in a few European plants and in some Californian collections.

12. S. MARINA (L.) Griseb. (PLATE 590, FIGS. 3a–3e, PLATES 591 and 592 and MAPS 7 and 8). Annual with 1–∞ diffuse stems from the base 5–35 cm. long: *internodes below the inflorescence* 4–30 mm. long, 0.6–2 mm. thick: *leaves not fascicled* or with 1 or 2 leaves in the axils, glabrous or glandular-pubescent, 5–40 mm. long, 0.6–1.5 mm. wide, bluntly mucronate; *stipules* deltoid, about as long as or sometimes a little longer than broad, 2–4 mm., usually 2.5–3 mm., long, apex not acuminate or only slightly so: *inflorescence a lax cyme,* sometimes very long, sometimes short; *internodes* glandular-pubescent or less often glabrous, the lowest 5–20 cm. long, 0.4–0.8 mm. thick: *bracts* foliaceous, the uppermost usually becoming minute, 3 mm. or less in length, or sometimes as much as 4–7 mm.[1]: *sepals* ovate, blunt-tipped, glabrous or glandular-pubescent, 2.4–5 mm. long; *petals* ovate, white, pink, or rosy, but often, when colored, white at the base, 1.6–4 mm. long, as much as 1–1.6 mm. shorter than the calyx; *stamens* 2–5; *styles* 3, separated to base, 0.4–0.6 mm. long: *mature capsules* 3.6–6.4 mm. long, equal to or as much as 2.2 mm. longer than the calyx: *fruiting pedicels* filiform, usually glandular-pubescent, sometimes glabrous, reflexed or not, the lowest 1–10 mm. long: *seeds light brown to deep reddish-brown, dull, smooth or slightly roughened by raised thickened places, but with no sculpture, glandular-papillate or not, papillae slender and small to thick and large, dark brown to white, all having dark brown, hard bases,* seeds usually 0.6–0.8 mm. long, only in rare cases as small as 0.5 or as large as 0.9 mm., usually not winged though occasionally with a white, usually erose wing which may be as broad as 0.4 mm.—Spicil. Fl. Rumel. et Bith. i. 213 (1843); Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 273 (1872), for the most part; Willk. & Lange, Fl. Hisp. iii. 165 (1880); Robins. & Fernald in Gray, Man. ed. 7, 378 (1908); J. K. Henry, Fl. So. Br. Columb. & Vanc. Is. 118 (1915), plants very likely *S. canadensis* var. *occidentalis. Arenaria rubra* β. *marina* L. Sp. Pl. i. 423 (1753);[2] also ed. 2; Torrey, Fl. N. & Mid. U. S. 456 (1824).

[1] See the discussion.
[2] Phrase-description is "Arenaria foliis linearibus longitudine intermediorum."

A. rubra β. L. Fl. Suec. ed. ii. 152 (1755).[1] *A. marina*[2] Allioni, Fl. Pedem. ii. 114 (1785); Roth, Fl. Germ. i. 189 (1788). *A. marina* (L.) Smith, Fl. Brit. ii. 480 (1800) and Eng. Bot. xiv. 958 & fig. (1802), probably a mixture of *S. marina* and *S. media,* the figure surely depicting *S. media;* Bigelow, Fl. Bost. ed. 3, 191 (1840), for the most part, excluding the synonym *Arenaria canadensis* Pers. *Stipularia marina* (L.) Haworth, Syn. Pl. Succ. 104 (1812). *Spergularia salina* J. & C. Presl, Fl. Cechica, 95 (1819); Gray, Man. ed. 5, 95 (1867); Robins. in Proc. Am. Acad. xxix. 311 (1894) and in Gray, Synop. Fl. i. 251 (1897); Chapman, Fl. So. U. S. ed. 3, 44 (1897); Fernald & Wiegand in Rhodora, xii. 162 (1910); Jepson, Fl. Calif. pt. v. 494 (1914) and Man. Fl. Pl. Calif. 360 (1923); Rydberg, Fl. Prair. & Plains, 322 (1932); Munz, Fl. So. Calif. 164 (1935); Macbride, Field Mus. Pub. Bot. xiii.—Fl. Peru pt. 2, no. 2, 632 (1937). *Lepigonum marinum* Wahlb. Fl. Gothob. 47 (1820), not as to plants discussed and references given which deal with *S. media;*[3] Kindberg, Synop. Lepig. 12 (1856), not as to description and literature cited which deal with *S. media.*[3] *L. marinum* (L.) Kindb. Mon. Lepig. 18, t. i, fig. 6 (1863), as to source of name but not as to description, excluding references, Griseb. and DC., all of which are *S. media,* and excluding *S. macrocarpa* and *S. rupestris.* *L. medium* sensu Wahlb. Fl. Gothob. 46 (1820), Linnaean authority for *media* not given but *A. rubra* β. *marina* L. given as a synonym, non *Arenaria media* L. (1762); sensu Koch, Syn. Fl. Germ. & Helv. ed. 2, i. 121 (1843), following Wahlb., non *Arenaria media* L. (1762). *L. medium* sensu Kindb. Synop. Lepig. 14 (1856), in part, at least as to the North American plants cited[4] and probably as to description, non *Arenaria media* L. (1762); sensu Kindb. Mon. Lepig. 24, t. ii, fig. 11 (1863), same treatment as in the Synop. Lepig., non *Arenaria media* L. (1762); sensu Wats. Smiths. Misc. Coll. no. 258 (Bibl. Index) 103 (1878), in small part, including those synonyms belonging with *S. marina,*[5] non *Arenaria media* L. (1762); sensu Brewer & Watson, Geol. Survey of California, Bot. i. 71 (1880), at least for the most part, non *Arenaria media* L. (1762). *Arenaria salina* (Presl) Seringe in DC. Prod. i. 401 (1824). *Spergula marina* Bartl. & Wendl. f. Beitr. Bot. ii. 64 (1825), probably as to plant but the authors refer to DC. "exclud. syn. Linn." *Alsine marina* (L.) Mert. & Koch in Roehl. Deutsch Fl. ii. 293 (1826);

[1] The same as Fl. Suec. ed. i. (1745). Phrase-description is "Arenaria foliis linearibus longitudine internodiorum" in both editions.

[2] No actual authority given for using *marina* but the Linnaean phrase for β. *marina* is used as a synonym; see discussion.

[3] Wahlberg here completely reverses the two Linnaean entities and is followed later by Kindberg in his Synopsis and also by Koch.

[4] *S. media* was probably not introduced or at least was not common in eastern North America at that time though I have seen none of the actual specimens cited. Also the capsule is said to be small which is not characteristic of *S. media.* Kindberg treats the large-capsuled *S. media* under *Lepigonum marinum* in the same work.

[5] Watson's treatment deals only with literature and includes synonyms belonging with many species, *e. g. S. marina, S. media* and *S. canadensis.*

Reichenb. Fl. Germ. 566 (1832); Webb & Berth. Phyt. Canar. i. 147 (1840), at least as to source of name but including many species such as *S. media, S. villosa,* etc. *Alsinella media* sensu Hornem. Nom. 32 (1827), who gives *Arenaria rubra marina* L. as the only synonym, non *Arenaria media* L. (1762). *Buda marina* (L.) Dumort. Fl. Belg. 110 (1827); Wats. & Coult. in Gray, Man. ed. 6, 89 (1889); Kuntze, Rev. Gen. iii, pt. 2, 13 (1898), at least as to source of name (*Moreno & Tonini* 343 is *S. ramosa,* and the synonyms *A. media* L. and *B. media* Dumort. belong with *S. media*); Macloskie, Report Princeton Univ. Exp. Patagonia, viii. i. pt. 5. 395 (1905), probably *S. media* as to plants. *Spergularia canadensis* sensu G. Don, Gen. Hist. Dichl. Pl. i. 426 (1831), in part, as to plants discussed because "plant pilose, rather hispid" and the southern part of range "Carolina" could apply only to *S. marina,* non *Arenaria canadensis* Pers. (1805). *Spergula rubra* β. Torr. & Gray, Fl. N. A. i. 175 (1838) (reference is made to *A. rubra* var. *marina* L.). *Lepigonum salinum* (Presl) Fries, Nov. Fl. Suec. Mant. 3, 34 (1839); Kindb. Synop. Lepig. 10 (1856); Kindb. Mon. Lepig. 36, t. iii, fig. 27 (1863), good figure and description; Smith, Eng. Bot. Suppl. v. 2978 (1864); Wats. in Smithson. Misc. Coll. no. 258 (Bibl. Index) 104 (1878). *Spergula salina* (Presl) D. Dietr. Syn. Pl. ii. 1598 (1840). *Alsine marina* α *minor* Heynh. Nom. 38 (1840), who gives *S. salina* Presl as synonymous. *Alsine heterosperma* Guss. Fl. Sic. i. 501 (1842) (gives *A. rubra* β. *marina* L. as a synonym). *Spergularia rubra* var. *marina* Gray, Man. 64 (1848), gives Linnaean authority for *rubra* but none for *marina.*[1] *Spergularia rubra* var. *marina* (L.) Gray, Man. ed. 2, 62 (1856), also Rev. Ed. and ed. 4, in part or possibly all as to plants discussed,[1] excluding the synonym *A. media* L. *Lepigonum neglectum* Kindb. Synop. Lepig. 6 (1856).[2] *L. salinum* * *Lepigonum canadense*[3] Kindb. Synop. Lepig. 11 (1856), as to plants described, probably. *L. leiospermum* Kindb. Mon. Lepig. 23, t. ii, fig. 10 (1863), excluding the synonyms *A. canadensis* Pers. and *A. media* Hooker f. and also the Falkland Island collection which is *S. media.* *L. rupestre* sensu Kindb. Mon. Lepig. 29, t. ii, fig. 13 (1863), in small part, including only the Montevideo (*Sello*) collections (see citations), excluding synonymy, citations, figure, and description, all of which apply to *S. rupicola* Lebel, non *Spergularia rupestris* Lebel (1848). *Spergula rubra* sensu Darby, Bot. So. States, 244 (1866) (*S. marina* because the stipules are described as ovate and plants as growing in salt marshes), non *Arenaria rubra* L. (1753). *Spergularia media* sensu Gray, Man. ed. 5. 95 (1867),

[1] Gray probably includes *S. canadensis* with *marina* because he says it is common on the seacoast and treats no other species besides *S. rubra.*

[2] Proved to be a synonym of *S. marina* because Kindberg, Mon. Lepig. 37 (1863), places *L. neglectum* as a synonym of *L. salinum* (Presl) Fries.

[3] Placed as a subordinate entity under *Lepigonum salinum,* obviously not in specific rank. Kindberg gives *Lepigonum canadense* Fisch. & Mey. Ind. Sem. Hort. Petrop. iii. 14 (1837), which is a *nomen nudum,* as to name and in no way refers to *Arenaria canadensis* Pers. (1805).

excluding reference *L. medium* Fries, non *Arenaria media* L. (1762); sensu Watson, Rep. King Exp. v. Bot. 42 (1871) (collection cited, *Watson* 177, is *S. marina*), non *Arenaria media* L. (1762). *S. miquelonensis* Lebel in Bull. Soc. Bot. France, xv. 58 (1868), *nomen nudum.*[1] *Spergula leiosperma* (Kindb.) F. Schmidt, Reisen Amurl. 131 (1868). *Spergularia heterosperma* (Guss.) Lebel, Mem. Soc. Sc. Nat. Cherb. xiv. 45 (1869); Heldr. ex Nym. Conspect. 122 (1878–1882). *S. neglecta* Syme, Engl. Bot. ed. 3, ii. 129, t. 255 (1873). *S. rubra* sensu Chapman, Fl. So. U. S. ed. 2, 48 (1884), non *Arenaria rubra* L. (1753). *Tissa marina* (L.) Britton in Bull. Torr. Bot. Club, xvi. 126 (1889); Greene, Fl. Francisc. 128 (1891), as to source of name but not as to description, because he states that the capsule is twice the length of the calyx and because he applies the name *T. salina* to what should be *S. marina* (Greene was probably describing *S. media*); Greene, Man. Bot. San Francisc. Bay 37 (1894), not as to description for same reasons as above; Britt. & Brown, Ill. Fl. U. S. ii. 37, fig. 1514 (1897); Small, Fl. Se. U. S. 418 (1903); Piper, Contrib. U. S. Nat. Herb. xi. (Fl. State Wash.) 263 (1906) (most and probably all the plants cited are *S. canadensis* var. *occidentalis*); Piper & Beattie, Fl. Nw. Coast, 145 (1915); Small, Man. Se. Fl. 502 (1933). *Tissa salina* (Presl) Britt. in Bull. Torr. Bot. Club, xvi. 127 (1889), as to source of name but not as to description which is that of *S. canadensis;* Greene, Fl. Francisc. 128 (1891) and Man. Bot. San Francisc. Bay, 37 (1894); Jepson, Fl. W. Mid. Calif. 170 (1901); Howell, Fl. Nw. Coast, 88 (1903); Heller, Muhlenbergia, vi. 96 (1910); Rydb. Fl. Rocky Mts. ed. 1, 279 (1917), also ed. 2; Tidestrom, Contrib. U. S. Nat. Herb. xxv. (Fl. Utah & Nevada) 197 (1925). *Tissa tenuis* sensu Greene in Bull. Torr. Bot. Club, xvi. 128 (1889), including collections *Rothrock* 154 and Santa Monica, *J. C. Nevin*, and excluding Alameda, *Greene* collection, which is *S. marina* var. *tenuis,* non *Lepigonum tenue* Greene (1887). *T. diandra* sensu Brandegee, Proc. Calif. Acad. Ser. 2, ii. 131 (1889), because collection cited is of *S. marina,* non *Arenaria diandra* Guss. (1827). *Buda marina* (?) var. *minor* Wat. & Coult. in Gray, Man. ed. 6, 90 (1889).[2] *Buda marina* var. *leiosperma* N. E. Brown apud Wats. & Coult. in Gray, Man. ed. 6, 90 (1889).[3] *Corion marinum* (L.) N. E. Brown in Syme, Engl. Bot. ed. 3, Suppl. 48 (1891). *Corion marinum* var. *leiosperma* (Kindb.) N. E. Brown[2] in Syme, Eng. Bot. ed. 3, Suppl. 48 (1891). *Tissa salina* var. *sordida* Greene, Fl.

[1] Lebel's combination is based upon an herbarium name, *Arenaria miclonensis* LaPylaie (B.), whose specimen is *S. marina.* Also, Kindberg mentioned this latter name among the "nomina inedita" omitted from the synonymy of his *L. salinum,* Mon. Lepig. 37 (note) (1863).

[2] I have never been able to find the Star Island plant collected by Sereno Watson, but I believe that it would be a puny specimen of *S. marina.*

[3] N. E. Brown sent a proof to the Gray Herbarium in which was a description of *Buda marina* var. *leiosperma.* Watson published this in 1889, with no reference to Kindberg, before N. E. Brown's work actually was completed. Brown finally published it as *Corion* (instead of *Buda*) *marinum* var. *leiosperma* in 1891.

Francisc. 129 (1891) and Man. Bot. San Francisc. Bay 37 (1894). *T. salina* var. *Sanfordii* Greene, Fl. Francisc. 129 (1891) and Man. Bot. San Francisc. Bay 37 (1894). *Spergularia salina* var. ? *minor* Robins. in Proc. Am. Acad. xxix. 312 (1894) and in Gray, Synop. Fl. i. 252 (1897). *Tissa sparsiflora* Greene in Erythea, iii. 46 (1895); Rydberg, Fl. Rocky Mts. ed. 1, 279 (1917), also ed. 2. *Spergularia salina* var. *leiosperma* (Kindb.) Gürke, Pl. Eur. ii. 196 (1897). *Tissa diandra bracteata* sensu Piper, Contrib. U. S. Nat. Herb. xi. (Fl. State Wash.) 264 (1906), in part, including only the collection, *Sandberg and Leiberg* 346, non *Spergularia salsuginea* var. *bracteata* Robins. (1897). *Spergularia sparsiflora* (Greene) A. Nels. in Coulter & Nels. New Man. Centr. Rocky Mts. 187 (1909). *S. leiosperma* (Kindb.) Fernald & Wiegand in Rhodora xii. 162 (1910). *Tissa leiosperma* (Kindb.) Heller, Muhlenbergia, vi. 84 (1910). *Spergularia salina* var. *sordida* (Greene) Jepson, Fl. Calif. 494 (1914) and Man. Fl. Pl. Calif. 360 (1923). *Alsine sparsiflora* (Greene) House in Am. Midl. Nat. vii. 134 (1921). *A. maritima* House in Am. Midl. Nat. vii. 133 (1921).[1]—North America and South America (where it is probably introduced); common along temperate seashores of the Atlantic coast from Quebec to Florida and of the Pacific coast from British Columbia to Lower California and in alkaline places in the interior of the continent.

The following citations are of plants with papillose seeds (see map 7).

Quebec: brackish marshes, Cacouna, Temiscouata Co., *Fernald*, August 8, 1902 (G., B.); salt marsh, Bic, River St. Lawrence, Rimouski Co., *Fernald & Collins* 1031, July 25 and 26, 1907 (G., U. S.). Prince Edward Island: damp brackish sand, Alberton, Prince Co., *Fernald & St. John* 7435, July 11, 1912 (G., U. S., Can., inflorescence leafy). New Brunswick: "La Prée," Memramcook, Westmoreland Co., *Victorin*, August 21, 1919 (G., U. S.); salt marsh 4 miles ne. of Sussex, Kings Co., *Svenson & Fassett* 1095, August 22, 1923 (G.); dry headlands, Grande Anse, Gloucester Co., *Blake* 5527, August 22, 1913 (G.), very small seeds 0.5–0.6 mm. long. Nova Scotia: salt marsh at head of Baddeck Bay, Victoria Co., *Fernald & Long* 21183, August 27, 1920 (G., U. S.); red sandstone alluvium near the brackish mouth of Salmon River, Truro, Colchester Co., *Fernald & Wiegand* 3327, September 11, 1910 (G.). Maine: old wharf, Pembroke, Washington Co., *Fernald* 1761, July 29, 1909 (G.); site of old pickle factory, North Berwick, York Co., *Fernald*, September 26, 1897 (G., N. E. B. C.). New Hampshire: Seabrook, Rockingham Co., *A. A. Eaton*, July 6, 1903 (G.). Massachusetts: Revere, Suffolk Co., *C. E. Faxon* (G.); salt marsh bordering Bass River, Yarmouth, Barnstable Co., *Fernald & Long*, Plant. Exsicc. Gray. 357, August 16,

[1] House bases this combination upon *Arenaria maritima* Pallas, Reise iii. 603 (1772–73), which is a *nomen nudum* and cited by index Kewensis as *Arenaria marina* Pallas.

1919 (G., D. S., U. C., Pom., inflorescence leafy). Rhode Island: Wickford, *Kennedy*, June 17, 1908 (G.). Connecticut: Groton, *Jansson*, August 3, 1927 (W.). New York: Northbeach, Long Island, *Heuser*, June 22, 1895 (B.); saline clay about the salt sheds, south of Liverpool, Syracuse, Onondaga Co., *Fernald, Wiegand & Eames* 14277, August 31, 1922 (G.). New Jersey: Weehawken, Hudson Co., *Van Sickle*, July 12, 1893 (U. S., inflorescence leafy); brackish marsh, e. of Sea Breeze, Cumberland Co., *Fogg* 8798, June 21, 1935 (Penn.). Delaware: tidal mud, Bakeoven Point, Kent Co., *Larson* 963, July 8, 1935 (Penn.); marshy land, 2 miles nw. of Woodland Beach, Kent Co., *Larsen* 532, June 21, 1934 (Penn.). Maryland: Chesapeake Beach, Calvert Co., *House* 1453, August 20, 1905 (U. S.). Virginia: sand at upper border of salt marsh, Wachapreague, Accomac Co., *Fernald & Long* 3926, July 26, 1934 (G.); shell heap, edge of tidal marsh, York River, n. of Williamsburg, James City Co., *Grimes* 4012, July 15, 1921 (G.); Virginia, *Clayton* 475, British Museum—photo. in G., our plate 592—marked "*Arenaria foliis linearibus longitudine internodiorum.* Hort. Cliff. p. 173", cited by Linnaeus, Sp. Pl. i. 423 (1753). North Carolina: Acracoke Island, Hyde Co., *Kearney* 2302, October 13, 1898 (U. S.). Florida: shore of St. John's River, Duval Co., *Fredholm* 5311, June 14, 1902 (U. S., seeds unusually small, 0.5–0.6 mm. long); low places subject to tidal inundation, North Beach, St. Augustine, St. John Co., *Donnell Smith*, March 21, 1884 (U. S., very small, nearly smooth seeds 0.5–0.6 mm. long). Bermuda: Spittal Pond, *R. B. Kennedy* 171, April 5, 1929 (G.); salt marsh near Spittal Pond, *Stewardson Brown* 591, February 10–March 9, 1908 (G.). Illinois: waste ground in city of Chicago, Cook Co., *Moffat* 283, August 12, 1893 (W.). Athabasca: Mackenzie Basin: near Heart (Raup) Lake, Wood Buffalo Park, about 59° 41′ N., 111° 56′ W., prairie along small salt creek, *Raup* 2343, August 20, 1928 (Can.) and salt plain, 2342, August 19, 1928 (Can.); Little Buffalo River, Wood Buffalo Park, *Russell*, July 31, 1926 (Can.). Idaho: Alpine Hot Springs, Bonneville Co. (on the Snake River, near the Wyoming Boundary), *Payson & Armstrong* 3432, July 9, 1923 (G., Pom., inflorescence leafy). Texas: Sabine Pass, Jefferson Co., *Reverchon* 3694, April 25, 1903 (G., U. S.). New Mexico: Bernalillo, Sandoval Co., 1555 m., *Arsène & Benedict* 15653, July 12, 1926 (U. S.). Baja California: springy slope, trail to cypress grove, Guadalupe Island, *J. T. Howell* 8287, March 17, 1932 (Cal. Acad., U. C., D. S.); Poso Grande, Southern District, *Brandegee*, March, 1889 (G.); San Carlos, Northern District, *Eastwood* 12409, September 10, 1923 (Cal. Acad.). California: near R. R. track, Linda Vista, San Diego Co., *Macbride & Payson* 783, July 6, 1915 (G.); waste water sink, West Riverside, Riverside Co., *F. M. Reed* 1131, July 8, 1906 (U. S., D. S.); ½ mile s. of Lake Elsinore, desiccating mud-flat, Riverside Co., *Munz* 5074, April 29, 1922 (Pom.); stream-bank, Aliso Canyon, Laguna Beach region, Orange Co., *D. L. Crawford*, July 26, 1916 (Pom.); Montebello,

Los Angeles Co., *Cecil Hart,* March 22, 1927 (Cal. Acad.); border of rainpool on alkaline flats 5.5 mi. north of Lancaster, Mojave Desert, Los Angeles Co., *J. T. Howell* 4896, May 12, 1930 (Cal. Acad.); coast highway near Pt. Mugu, Ventura Co., *Abrams* 13691, June 26, 1935 (D. S., both smooth- and papillose-seeded plants on same sheet); along beach, Ventura, Ventura Co., *Eastwood* 5026, April 17, 1916 (Cal. Acad.); sandy flat on shore, Dix Cañon, Santa Cruz Island, Santa Barbara Co., *Clokey* 5150, May 26, 1930 (G.); La Graciosa, Santa Barbara Co., *Eastwood* 858, July 2, 1906 (G.); Santa Barbara, *Rothrock* 154, July, 1875 (G.); Piedras Blancas, San Luis Obispo Co., *Eastwood & Howell* 5987, June 15, 1938 (Cal. Acad.); Hollister, San Benito Co., *Setchell,* April 14, 1897 (U. C.); near Hollister, San Benito Co., *Eastwood & Howell* 4298, May 4, 1937 (Cal. Acad.); colonies in low alkaline spots, Searsville, San Mateo Co., *C. F. Baker* 1859, October 20, 1920 (G., U. S., Cal. Acad., U. C., Pom., determined as *Tissa sordida* by E. L. Greene); near Alameda, Alameda Co., *Greene,* July 31, 1887 (G., specimen only fragmentary but characteristic of *S. marina,* marked *T. sordida* Greene); at Alameda, Alameda Co., *Greene,* July 21, 1887 (U. C.); eastern Livermore Valley, Alameda Co., *J. T. Howell* 13742, April 10, 1938 (Cal. Acad.); colonies occasional on the alkaline plains, Byron, Contra Costa Co., *C. F. Baker* 2865, April 27, 1903 (G., U. S., Notre Dame, U. C., Pom., determined as *Tissa Sanfordii* by E. L. Greene); wet soil of low field at Holt, San Joaquin Co., *J. T. Howell* 10792, September 2, 1932 (Pom.); Calistoga Hot Springs, Napa Valley, *J. P. Tracy* 1858, May 18, 1903 (U. C.); growing alone on muddy banks, Drake's Estero, 8 miles west of Inverness, Marin Co., *G. B. & R. P. Rossbach* 629, May 26, 1938 (G., D. S.); salt marsh at base of sand dunes, Bodega Bay, Sonoma Co., *G. B. & R. P. Rossbach* 630, May 27, 1938 (G., D. S.); 12 miles n. of Dixon, Yolo Co., *Doris K. Kildale* 5033, May 8, 1928 (D. S.); gray clay, alkaline soil, near Colusa, in the valley oak belt, Colusa Co., *Heller* 13541, April 10, 1921 (U. S., D. S.); in wet irrigation ditch, 3 miles e. of Williams, Colusa Co., *G. B. & R. P. Rossbach* 632, May 21, 1938 (G., D. S.). Oregon: on ballast, Lower Albina, Portland, Multnomah Co., *Sheldon* S.9909, July 20, 1902 (Ore.). Washington: salt marsh, Port Hadlock, Jefferson Co., *G. N. Jones* 3100, June, 1931 (W.). Brazil: in den Salinen bei lago Friv. (Lake Feia?), Rio de Janeiro, *Ule* 4699, October 19, 1899 [B.]; *Sello* d2381 (d2167–2438 ebenda S. Francisco do Paula und Villa Rio Grande do Sul, October, November, 1824)[1] (B., one sheet marked *Lepigonum neglectum* Kindb. 1861).[2] Port Alegre, Prov. Rio Grande do Sul, *Tweedie* (K.). Brazil, no locality: *Sello,* (Leiden). Uruguay: Montevideo, *Sello* d208 (B., 4 sheets, one marked "*Spergularia salina* Presl quoad planta Selloana det. P. Rohrbach" and *Lepigonum rupestre* (Lebel) Kindb. 1861. Montevideo, *Sello* d207 (B., marked *Lepigonum neglectum*

[1] Urban in Engler, Bot. Jahr. xvii. 196 (1893).
[2] Cited by Kindb. under *L. salinum,* Mon. Lepig. 38 (1863).

Kindb. 1861);[1] Montevideo, *Gibert* 170, 989 (K.); in dry sand, Curarein, *Berro* 2556, September 24, 1902 (K.); Pocitos-Malvin, Montevideo, *Herter* 76201, November, 1924 (B.). Argentina: Prov. Buenos Aires: in suelo anegadiso cerca del rio de la Plata, Isla Mariel, *Burkart* 3044, December 6, 1928 (B.); wet saline places, Bañado de Flores, Buenos Aires, *Parodi* 5934, November 16, 1924 (B.). Prov. Jujuy: El Volcan, *Hieronymus & Lorentz* 731 & 735, May 12 and 13, 1873 (B.). Prov. Santa Cruz: Puerto San Julian, *M. E. Blake* 192, April, 1933 (K.).

The following citations are of plants with smooth seeds (see map 8).

Ile Miquelon: maritime shores, bord du Grand Étang, *Arsène* 253, August 16, 1900 (G.). Quebec: damp hollows, gravelly beach, Carleton Point, Carleton, Bonaventure Co., *Collins & Fernald*, July 21, 1904 (G.). Magdalen Islands: damp, brackish, sandy beach, Grande Entreé, Coffin Island, *Fernald, Long & St. John* 7427, August 19, 1912 (G., U. S., Can., U. C.). Prince Edward Island: border of salt marsh, Bunbury, Queens Co., *Fernald, Long & St. John* 7426, August 28, 1912 (G., Can.). New Brunswick: shore, Shippigan, Lameque, Gloucester Co., *Blake* 5538A, August 26, 1913 (G.); marsh, Richibucto, Kent Co., *Blake* 5712, September 22, 1913 (G.); St. Andrews, Charlotte Co., *Fowler*, July 28, 1900 (U. S.). Nova Scotia: brackish beach of Wallace Lake, Sable Island, *H. St. John* 1222, August 14, 1913 (G., Can., U. S.); brackish gravelly beach by Baddeck Bay, Baddeck, Victoria Co., *Fernald & Long* 21187, August 27, 1920 (G., Can.); upper border of gravelly strand, Villagedale, Shelburne Co., *Fernald, Long & Linder* 21184, August, 1920 (G., Can.); waste places and roadsides, Windsor, Hants Co., *Fernald, Bartram & Long* 23831, July 25, 1921 (G., Can.). Maine: dryish strand, eastern side of Moose Island, Passamaquoddy Bay, Washington Co., *Fernald* 2216, August 16, 1909 (G., Cal. Acad.); shores of Pool, Great Cranberry Isle, Hancock Co., *Rand & Redfield*, August 30, 1892 (Penn.); on small barrier beach sw. shore of Warren Island, Islesboro, Waldo Co., *R. P. & G. B. Rossbach*, September 4, 1935 (G.). New Hampshire: Star Island, Isles of Shoals, Rockingham Co., *E. F. Williams*, September 19, 1901 (G.); Little Harbor, Rye, Rockingham Co., *E. F. Williams*, September 19, 1901 (G.). Massachusetts: salt marsh, Newbury, Essex Co., *E. F. Williams*, July 31, 1898 (G.); Woods Hole, Barnstable Co., *Pennell* 3338, July 26, 1911 (Penn.). Rhode Island: salt marshes about Harbor Pond and Tim's Pond, Block Island, Newport Co., *Fernald & Long* 9477, August 19, 1913 (G.). Connecticut: sandy bank of Housatonic River, Milford, New Haven Co., *E. H. Eames*, August 15, 1895 (U. S.); brackish shore, flowers white, Norwalk, Fairfield Co., *E. H. Eames* 9732, July 24, 1921 (G.). New York: sandy beach, Fisher's Island, Suffolk Co., *H. St. John* 2719, August 10–15, 1920 (G.); salt marshes, Wading River

[1] Cited by Kindb. under *L. rupestre*, Mon. Lepig. 29 (1863).

Northville, Suffolk Co., Long Island, *H. W. Young*, August 12, 1873 (U. S.). New Jersey: sand over brackish marsh, Brigantine Beach, Atlantic Co., *Fogg* 9544, August 26, 1935 (Penn.); brackish marsh near West Creek, se. of Delmont, Cumberland Co., *Fogg* 5619, June 22, 1933 (Penn., two sheets very different in habit); Port Norris, *J. H. Holmes*, September, 1898 (Pom.). Delaware: sandy beach, 1 mile so. of Bower's Beach, Kent Co., *Larsen* 918, July 24, 1935 (Penn., bracts of inflorescence very small). Carolina: no definite locality, ad littora maris, *Beyrich* (B., marked *L. leiospermum* Kindb. 1861).[1] Alabama: ballast banks, Mobile River, *Mohr*, May, 1883 (U. S.). North Dakota: w. of Cushion Slough, Kenmore, Ward Co., *F. P. Metcalf* 583, October 3, 1917 (U. S.); Eckelson Lake, Sanborn, Barnes Co., *D. C. Mabbott* 291, August 8, 1917 (U. S.). Texas: Virginia Point, *W. L. Bray* 35, April 15, 1899 (U. S.); near San Elizario (fide added note on U. S. sheet), El Paso Co., *C. Wright* 1324, 1852 (G., U. S.). Alberta: garden patch, Garden Plains, Red Deer Co., *Brinkman* 2767, June 29, 1927 (U. S.). Saskatchewan: 15 miles w. of Saskatoon, Saskatoon Co., *Macoun & Herriot* 70906, July 29, 1906 (G., Can., Pom.); Saskatchewan Plains, *Macoun*, Bot. Railr. Surv. 287, August 19, 1872 (G.); salt marshes west of Long Lake, *Macoun* 2674, July 10, 1879 (Can.). Montana: dried encrusted shore of an alkaline lake, Lake Bowdoin, e. of Malta, Phillips Co., *G. B. & R. P. Rossbach* 308, July 6, 1936 (G., D. S., U. S.). Wyoming: Laramie, Albany Co., *A. Nelson* 1868, September 3, 1895 (G., U. S., U. C., Pom.); Seven Mile Lake, Albany Co., *A. Nelson* 1158, October 15, 1894 (G., U. S., Notre Dame, type collection of *Tissa sparsiflora* Greene). Colorado: New Windsor, Weld Co., *Osterhout* 2347, August 8, 1901 (U. S., U. C.), July, 1896 (G.), September 19, 1900 (Pom.), July 7, 1907 (D. S.). Utah: 6000 ft. alt., Wahsatch, *Watson* (King Exped.) 177, 1869 (U. S., G.); in wet places, Kelton, Box Elder Co., *Garrett* 5414, August 15, 1929 (D. S.); alt. 4300 ft., Salt Lake City, Salt Lake Co., *M. E. Jones* 1088, July 26, 1879 (B., U. S., U. C., Pom.). Nevada: se. of Reno, Washoe Co., *F. H. Hillman* July 20, 1894 (Pom.); caked alkali ground, St. Thomas, Muddy R., Clark Co., *Goodding* 696, May 3, 1902 (G., U. S.). Arizona: Tucson, Pima Co., *Toumey*, May 30, 1894 (N. Y., U. C.); Sacaton, Pinal Co., *Peebles* 1265, March 23, 1926 (U. S.); Agua Caliente, Maricopa Co., *J. I. Carlson*, March 19, 1914 (Cal. Acad.). New Mexico: Albuquerque, Sandoval Co., *M. E. Jones*, July, 1884 (Pom.). Lower California: San Vincente, Northern District, *Brandegee*, June 1, 1893 (U. C.). California: Carisso Creek (this creek just sw. of the Salton Sea in both San Diego and Imperial Cos.) Colorado Desert, *Brandegee*, March 26, 1901 (U. C.); semi-alkaline spot, Garlic Springs, Mohave Desert, San Bernardino Co., *Munz & Keck* 7935, April 10, 1924 (G., Pom.); dry mud flat, s. of Lake Elsinore, Riverside Co., *Munz* 5070, April 29, 1922 (Pom.); Balboa, Orange Co., *Abrams* 6565,

[1] Cited under *Lepigonum leiospermum* Kindb. Mon. Lepig. 24 (1863).

June 23, 1917 (D. S.); low brackish flat near coast, Redondo, Los Angeles Co., *Braunton* 308, May 25, 1902 (U. S., D. S.); Santa Monica, Los Angeles Co., *J. C. Nevin* 647, 1881 (G.,[1] D. S.);[2] coast highway near Pt. Mugu, Ventura Co., *Abrams* 13691, June 26, 1935 (Pom., one plant with papillose seeds and two with smooth seeds; see also citation under papillose seeds); Santa Barbara, Santa Barbara Co., *Rothrock* 154, July, 1875 (G.);[1] margin of Soda Lake, Carisso Plain, San Luis Obispo Co., *Ferris & Rossbach* 9467, May 12, 1938 (G., D. S.); alkaline flats ½ mile from Earlimart, near U. S. Highway no. 99, Tulare Co., *Ferris & Rossbach* 9669, May 21, 1938 (D. S.); Mercey Hot Springs, Fresno Co., *Eastwood & Howell* 5206, April 20, 1938 (Cal. Acad.); Salinas River, Neponset, Monterey Co., *Abrams* 4029, September 29, 1903 (D. S.); Carmel River, Monterey Co., *Mrs. Joseph Clements*, August 15, 1910 (Pom.); Oakland, Alameda Co., *Wm. Holder*, State Survey 2578 (U. C.); Livermore Pass, Mt. Diablo region, Alameda Co., *Burtt Davy*, May, 1898 (U. C., Pom.); on mucky flats subject to overflow, Stone Lagoon, Humboldt Co., *J. P. Tracy* 5865, August 7, 1921 (U. C.). Oregon: Marshfield, Coos Co., *Walton Haydon* 527, 1914 (Cal. Acad.); salt marsh on tide flats, Toledo, Lincoln Co., *J. C. Nelson* 2355, July 5, 1918 (G.); salt marshes, Tillamook, Tillamook Co., *T. J. Howell*, July, 1882 (B., U. C., Ore.); muddy banks bordering salt marsh at Bay City, 7 miles n. of Tillamook, Tillamook Co., *G. B. & R. P. Rossbach* 627, June 22, 1938 (D. S., G.); Hot Lake, Union Co., *Piper* 5198, June 22, 1921 (U. S.). Washington: North Head, *E. A. McGregor*, August 13, 1907 (D. S.); near Egbert Spring, Douglas Co., *Sandberg & Leiberg* 346, July 1, 1893 (G., U. S., B., Cal. Acad., U. C., Ore.); in pasture on Johnson Creek, Hudson's place, north of Omak, Okanogan Co., *C. B. Fiker* 1155, September 1, 1932 (D. S.); tide land, Marysville, Snohomish Co., *J. M. Grant*, July, 1927 (Pom.), June, 1920 (D. S.). British Columbia: shores of alkaline lakes, Kamloops, *Macoun* 2673, June 13, 1889 (Can.); vicinity of Sidney, Vancouver Island, *Macoun* 86988 (Can.); in a salt marsh at Sidney, Vancouver Is., *Macoun* 78519, July 28, 1908 (Can.).

The following citations are of plants with a few papillae on the rim at the summit of the seed.

Prince Edward Island: Charlottetown, Queens Co., *Fernald & St. John* 210, August 13, 1914 (U. S., G., Cal. Acad., D. S., U. C., W.); Summerside, Prince Co., *Churchill*, July 21, 1901 (G.). New Brunswick: Tracadie, Gloucester Co., *Blake* 5648, September 10, 1913 (G.); beach, Portage Island, Northumberland Co., *Blake* 5681, September 17, 1913 (U. S., G.); Shediac Island, Westmoreland Co., *F. T. Hubbard*, August 5, 1914 (G.). Nova Scotia: Cape Breton Island, *Macoun* 19033, August 19, 1898 (G.); Canso, Guysborough Co., *Fowler*,

[1] Marked *S. tenuis* Robinson, Syn. Fl. N. Amer.
[2] Cited under *Tissa tenuis* Greene ex Britt. in Bull. Torr. Bot. Club, xvi. 128 (1889).

August 6, 1901 (U. S.). MAINE: Warren Is., Islesboro, Waldo Co., *G. B. & R. P. Rossbach*, September 4, 1935 (G.). MASSACHUSETTS: Harwich, Barnstable Co., *Fernald* 16783, July 13, 1918 (U. S.); shore of Great Tisbury Pond, Chilmark, Martha's Vineyard, *F. C. Seymour* 1199, July 25, 1916 (U. S.). RHODE ISLAND: Westerly, Washington Co., *Woodward*, August 4, 1917 (G.). NORTH CAROLINA: Bettie, Carteret Co., *L. F. & F. R. Randolph* 816, July 17, 1922 (G.). TEXAS: Morgan's Point, Harris Co., *E. J. Palmer* 11959, May 20, 1917 (U. S., U. C.); Port Arthur (McFadden Ranch), Jefferson Co., *Martin & Warren*, May 9, 1930 (U. S.). WASHINGTON: vicinity of Port Townsend, Jefferson Co., *M. A. Barber* 156, August 12, 1899 (G.); Straits of De Fuca, nw. coast of America, *W. Arnott* 3 (B., marked *Lepigonum neglectum* Kindb. 1861).

Plants belonging to *S. marina* may be either smooth- or papillose-seeded. At first thought one would feel that plants with such different seeds should not be included in the same entity. However, measurements of lengths of capsules, sepals, petals, stipules, etc. of smooth-seeded plants do not differ from those of papillose-seeded plants. Furthermore, the seed-size and -surface are the same, the only difference being the presence or absence of glandular papillae. Indeed occasional plants have a few scattered papillae upon the rim of the seed or only one or two upon the whole seed (see citations). One may not worry about the fact that the seeds may be of these two types, for many other species are similar in this respect, *e. g. S. villosa, S. platensis, S. canadensis, S. ramosa, S. fasciculata, S. pycnantha,* and *S. diandra.* Further to clinch this decision, the distribution of plants with smooth seeds practically coincides with that of plants with papillose seeds (see MAPS 7 and 8). It is true that papillose-seeded plants have not been collected as often in the interior of the country; but the fact remains that there, few collections even of smooth-seeded plants have been made. It has not been proved that there papillose-seeded plants are not as widespread as smooth-seeded ones.

In smooth-seeded plants on the east coast, Profs. Fernald and Wiegand[1] have noted that the bracts at the uppermost nodes are more conspicuous than in the papillose-seeded ones. It is true that on the east coast the majority of the papillose-seeded plants have bracts at the upper nodes measuring only 1.5–2.5 mm. long, while those of smooth-seeded plants measure 3–7 mm., always using most mature plants. Exceptions in the same region may be found, however, showing papillose-seeded plants with long bracts and smooth-seeded ones

[1] RHODORA, xii. 157 (1910).

with short bracts. In studying this same problem on the west coast, the vast majority of mature individuals of smooth- and papillose-seeded plants have been found to have the uppermost bracts 3 mm. or less in length and only rarely does one find longer bracts, which then occur in both kinds of plants.[1] With all this evidence in favor of the unity of both kinds of plants, the separate species *S. leiosperma*, taken up by Fernald and Wiegand,[2] is not tenable. Because of the fact that the character of the upper part of the inflorescence being leafy does not hold over a great part of the range, and never does mark a sharp division between the two kinds of plants, *S. leiosperma* is not tenable, even as a variety.

Linnaeus under β. *marina* of 6. *Arenaria rubra* in Sp. Pl. i. 423 (1753) gives the following:

> β. Arenaria foliis linearibus longitudine intermediorum. marina.
> *Hort. cliff.* 173. *Gron. virg.* 161. *Roy. lugdb.* 451.
> Spergula marina nostras. *Raj. hist.* 1034.
> Alsine spergulae facie media. *Bauh. pin.* 251.
> *Habitat* α *in* Europae *arenosis collibus*, β. *in litoribus marinis.* ⊙
> *Stamina in campestri certe* 10, *sunt; in maritima prope Aboam stamina tantum 5 observavit D. Kalm.*

The Linnaean herbarium has the type of *Arenaria rubra* L. but nothing marked β. *marina* or bearing the Linnean phrase-name, above quoted, describing β. *marina*, or bearing any of the synonymous phrase-names occurring in the quotation above.

Linnaeus, Hort. Cliff. 173 (1737), gives, "3. Arenaria foliis linearibus longitudine internodiorum."[3] The Clifford herbarium contains three specimens filed under "Arenaria foliis longitudine internodiorum"[4] but none of them have this phrase on the sheet. One of these sheets bears the number 6 and the phrase, "Alsine spergulae, facie media" and, in a different hand, "Spergula saginoides."[5] *Alsine spergulae facie media* C. Bauhin, Pinax, 251, occurs as a synonym of *Arenaria foliis linearibus longitudine internodiorum* in Hort. Cliff.

[1] A collection made by Prof. L. R. Abrams 13691, at Mugu Pt., Ventura Co., California (see citations), shows plants with smooth seeds snd others with papillose seeds but otherwise with no difference whatever, the bracts even being identical. These seed-differences were checked by using seeds from within the capsules.

[2] Rhodora, xii. 157 (1910).

[3] "Intermediorum" of Sp. Pl. (1753) is a *lapsus calami*, corrected in ed. 2.

[4] I understand that the Clifford herbarium, as well as the Linnaean herbarium, is arranged in the order of the book. These sheets bear in the lower left corner in pencil, "p. 173 *Arenaria*. 3" which corresponds to the page-number and species-number under *Arenaria* in Hort. Cliff.

[5] In the herbarium of Clifford in the British Museum, photograph in Gray Herbarium. Data from these sheets by courtesy of Mr. C. A. Weatherby.

and in Sp. Pl. Therefore this plant, bearing Bauhin's phrase-name was probably part of the basis of *Arenaria foliis* etc. of Linnaeus. The Clifford specimen is in good condition, with mature capsules and papillose seeds, and corresponds in habit and all measurements with the species under discussion.

Another sheet has the number 7 and the inscription, "Alsine (folio flore subcaeruleo, [crossed out]), spergulae facie minor" and in a different hand "Arenaria rubra."[1] This phrase is very similar to that under *Arenaria rubra α. campestris,* L.[2] namely, "Alsine, spergulae facie, minor s. Spergula minor, subcaeruleo flore." The plant is immature, but resembles that upon the sheet last discussed which probably belongs to β. *marina* of Linnaeus. One cannot be sure, then, whether this plant is the type of α. *campestris* L.[3] or was considered as belonging to the *marina* phrase-name by Linnaeus but never relabeled as such. At least it cannot be considered the type of *Arenaria rubra,* β. *marina* L.

The third sheet has the label, "Alsine montana capillaceo folio. C. B. p. 251. Spergula dicta major. Spergula facie minor. Spergula minor flosculis sub . . . [word illegible] C. B."[4] The plant is *Scleranthus annuus* fide Mr. C. A. Weatherby. Since these citations do not appear in the synonymy of *Arenaria rubra* in Sp. Pl. or in any of the references given there and since the plant is not even a *Spergularia,* this cannot be the type of Linnaeus' β. *marina.*

Therefore, of these three sheets only one, *namely that with no. 6 and the inscription "Alsine spergulae facie media" can be the type of Arenaria rubra β. marina L., since Linnaeus gives "Alsine spergulae facie media" as synonymous with Arenaria rubra β. marina in Sp. Pl. and with "Arenaria foliis linearibus longitudine internodiorum" in Hort. Cliff.*

Further to solidify the basis for the retention of the name *marina,* *Clayton* 475, cited by Gronovius, Fl. Virg. 161 (1739) may be considered.[5] The reader will recall that this reference was given by Linnaeus under *Arenaria rubra* β. *marina.* *Clayton* 475 bears the

[1] In the herbarium of Clifford in the British Museum, photograph in Gray Herbarium. Data from these sheets by courtesy of Mr. C. A. Weatherby.

[2] Sp. Pl. i. 423 (1753).

[3] *Arenaria rubra* α. *campestris* Linn. Sp. Pl. i. 423 (1753) is certainly a mystery. Whether Linnaeus meant it to be a separate variety under *A. rubra* or merely that part of *rubra* not belonging to β. *marina* and therefore synonymous with *A. rubra,* I do not know. This is the only specimen I have been able to locate which is at all traceable to α. *campestris.*

[4] This corresponds to III under *Alsine alpina* in C. Bauhin, Pinax, 251 (1623).

[5] In the British Museum—photograph in Gray Herbarium.

phrase-name "Arenaria foliis linearibus longitudine internodiorum, Hort. Cliff. p. 173", which is cited by Gronovius in his Flora Virginica. The specimen is mature and bears papillose seeds like those of the plants cited for *S. marina* in this monograph and like those of the type of *Arenaria rubra* β. *marina* L.

With actual specimens known as the basis for *Arenaria rubra* β. *marina* L., all that remains is to confirm the first use of the epithet in the specific rank. This is *Arenaria marina* All. Fl. Pedem. ii. 114 (1785).[1] Allioni gives no direct authority for the epithet, but he does give the Linnaean phrase-name and cites Gouan, Fl. Monspel. 242 (1765). Although Gouan at this place uses the Linnaean names (*A. rubra, α. campestris* and β. *marina*), he does not refer to Linnaeus. He does, however, cite his own Hortus Monspeliensis, 218 (1762), where reference is made to the Species Plantarum and the Linnaean phrase-name is quoted under the second variety (*marina*). The origin of Allioni's epithet may thus be traced pretty clearly to Linnaeus.[2]

According to Burnat, Fl. Alp. Marit. i. 274 (1892), nearly all of Allioni's specimens labelled *A. marina* are *S. media* (*S. marginata* of Burnat's treatment). But whatever Allioni's plant, his epithet is taken from Linnaeus and his combination must be kept for the group represented by the Linnaean type. Since, as shown above, the identity of this type is clear, there is no occasion to reject the epithet *marina*, as has been done by Briquet, Prod. Fl. Corse, i. 492 (1910), and others.

The type of *Tissa salina* var. *sordida* Greene does not differ in any characters from papillose-seeded plants of *S. marina*. Greene says, "herbage viscid and hairy; fl. in unilateral leafless racemes: . . ." Quantity of pubescence has little significance in classifying Spergularias and within *S. marina* itself all degrees may be found from very

[1] The citation often made, *Arenaria marina* Pall. Reise, iii. 603 (1776) is an error. Pallas used the name *A. maritima*, and only as a *nomen nudum*.

[2] Allioni also refers to his own Auctarium ad Synopsin methodicam Stirpium Horti Regii Taurensis, published in Miscellanea Taurinensia, v. 53–96 (1770–73). Here (p. 87) Allioni describes *Arenaria maritima* (overlooked by the *Index Kewensis* and most, if not all, authors), as an independent new species, said to differ from *A. campestris* in having ten stamens, capsule greatly exceeding the calyx and winged seeds. He particularly emphasizes the number of stamens. If, as Allioni evidently supposed, *A. maritima* were really synonymous with the true *S. marina*, the former name, as the earliest in the specific category, would have to be taken up for the present species. But the description, especially the number of stamens, suggests *S. media* rather than *S. marina;* and Burnat mentions no specimen of Allioni's labelled *A. maritima*. Until this last name can be attached to a definite type, it would be most unwise to take it up.

ARENARIA RUBRA β. MARINA L.

Clayton's 475, the basis of the Gronovian reference given by Linnaeus; photograph by courtesy of Mr. JOHN RAMSBOTTOM.

sparse hairs only on the pedicels to a dense covering over the whole plant. The flowers often occur in unilateral racemes, leafy or not, throughout the range.

Tissa salina var. *Sanfordii* Greene is also regarded as a synonym because, although the author has been unable to find the type, a specimen collected by C. F. Baker 2865, April 27, 1903, and determined by Greene as var. *Sanfordii* is identical in papillose seeds, capsules, sepals, size and habit with many of the collections here cited under *S. marina.* Greene's description, "Stems erect repeatedly dichotomous; herbage scarcely viscid and only slightly pubescent: inflorescence partly dichotomous, only the ultimate branchlets unilaterally racemose: seeds dark brown, nearly smooth, wingless," has nothing except "stems . . . repeatedly dichotomous," which makes it at at all different from *S. marina. S. marina* may, indeed, have several times compounded cymes. A high degree of dichotomy is seen in the type of *S. marina* var. *tenuis* (see below) but the Baker specimen discussed above has capsules too large for var. *tenuis.*

Greene's *Tissa sparsiflora* has as distinguishing characters: stems very long, nearly a foot in length; "flowers mostly solitary, one to each pair of leaves"; "slender pedicels shorter than the leaves"; "pedicels not forming a distinct cyme even at the ends of the branches"; "capsule ovate, obtusish, exceeding sepals." Greene seems to have named this plant because it came from the "interior of the continent" and because of its sprawling, long-noded stems which necessitates the flowers seeming to be sparse. All flowers of the genus are solitary, *i. e.* one at each node. Perhaps Greene meant that the plants were not cymose, for certainly pedicels do not make cymes. The type collection,[1] however, definitely has compound cymes, though they are obscured by general leafiness and sprawling stems. The description of the capsule shows no difference from that of *S. marina* and the seeds are typical of smooth-seeded plants. Therefore no distinguishing character remains but the sprawling stems, and that certainly is not sufficient for the separation of a taxonomic entity. More recent collections from Wyoming[2] show plants with much shorter stems and in some cases not at all lax.

[1] Seven Mile Lake, Wyoming, *Aven Nelson* 1158, October, 15, 1894. Prof. Nelson says that the label designates an uncharted lake 7 miles sw. of Laramie on the Woods Landing Road.

[2] Laramie, Wyoming, *Aven Nelson* 1868, September 3, 1895 (U. C., Pom.); Soda Lakes, *Aven Nelson* 5349, September 24, 1898 (U. C.).

13. Var. **tenuis** (Greene), comb. nov. (MAP 9). *Stems more highly branched: inflorescence crowded, with many flowers; sepals usually shorter,* 1.6–3.8 mm. long; *petals* usually shorter, 1.4–2.2 mm. long: *mature capsules usually shorter,* 3–4.4 mm. long, exceeding the calyx by 0.6–2 mm.: *seeds* as in the typical variety, though usually smooth in the specimens collected.—*Lepigonum tenue* Greene, Pittonia, i. 63 (1887). *Tissa tenuis* Greene ex Britt. in Bull. Torr. Bot. Club, xvi. 128 (1889), in part, as to plants, including the *Greene* collection and excluding the *Rothrock* and *J. C. Nevin* plants, which are characteristic *Spergularia marina;* Greene, Fl. Francisc. 129 (1891) and Man. Bot. San Francisc. Bay, 37 (1894). *S. tenuis* (Greene) Robins. in Proc. Am. Acad. xxix. 311 (1894) and in Gray, Synop. Fl. i, pt. i, 251 (1897); Jepson, Fl. Calif. pt. 5, 494 (1914) and Man. Fl. Pl. Calif. 360 (1923). *S. tenuis* var. *involucrata* Robins. in Gray, Synop. Fl. i. pt. 1, 251 (1897). *Tissa salina* var. *involucrata* (Robins.) Jepson, Fl. W. Mid. Calif. 170 (1901). *T. salina* var. *tenuis* (Greene) Jepson, Fl. W. Mid. Calif. 170 (1901). *S. salina* var. *involucrata* (Robins.) Jepson, Fl. W. Mid. Calif. ed. 2, 156 (1911). *S. salina* var. *tenuis* (Greene) Jepson, Fl. W. Mid. Calif. ed. 2, 156 (1911); Munz, Fl. So. Calif. 164 (1935). *Alsine tenuis* (Greene) House in Am. Midl. Nat. vii. 133 (1921).—NORTH AMERICA: low alkaline places in the valleys of central California. CALIFORNIA: in alkali soil near Delano, Kern Co., *Burtt Davy* 2438, 1896 (U. C.); Tulare, Tulare Co., *K. Brandegee,* April, 1889 (G.); Hollister, San Benito Co., *Setchell,* April 14, 1897 (U. C.; see the same collection under *S. marina*); near Hollister, San Benito Co., *Eastwood & Howell* 4297, May 4, 1937 (Cal. Acad., G.; see coll. from same place, no. 4298, under *S. marina*); marsh, Alviso, Santa Clara Co., *Dudley,* November 9, 1903 (D. S.); near Newark, Alameda Co., *Burtt Davy* 1113, May 6, 1895 (U. C.); Mt. Eden, Alameda Co., *K. Brandegee,* April, 1891 (G., type of *S. tenuis* var. *involucrata* Robins.); Alameda, Alameda Co., *Greene,* May 17, 1887 (G., D. S., U. C., Notre Dame, TYPE of *Lepigonum tenue* Greene); Byron Springs, Contra Costa Co., *K. Brandegee,* May 8, 1916 (Pom.); Stockton, San Joaquin Co., *J. A. Sanford* 89, 1890–91 (U. C.; note on same sheet a collection, no. 341, of typical *S. marina* from same place); 12 miles north of Dixon, Yolo Co., *Doris K. Kildale* 5032, May 8, 1928 (D. S.; note coll. 5033 from same place under *S. marina*); hard-packed alkaline clay depression in the plains, 5 miles west of Colusa, Colusa Co., *G. B. & R. P. Rossbach* 638, May 31, 1938 (G., D. S., Cal. Acad.; note coll. no. 641 of *S. marina* in same herbaria from same place); Williams, Colusa Co., *K. Brandegee,* about 1891 (G., seeds papillose); roadside ditches, alkaline mud 3¾ miles south of Maxwell, Colusa Co., *G. B. & R. P. Rossbach* 640, May 31, 1938 (G., D. S.); alkaline ground near irrigation ditch, growing with *Distichlis,* 2 miles so. of Maxwell, Colusa Co., *G. B. & R. P. Rossbach* 636, May 31, 1938 (G., D. S., U. S., Cal. Acad., Pom., U. C., seeds papillose; note no. 637 under *S. marina* from the same place).

These plants are common within their range but nearly always occur along with characteristic *S. marina.* Var. *tenuis* always differs in being more slender, more highly branched, and more crowded with smaller flowers. Usually the capsule exceeds the calyx more than in typical *S. marina.* While collecting and observing these plants in 1938 from Colusa Co. to Yolo Co., the author found that the variety was always easily distinguished from the more typical forms of the species, no intergrades being found. The variety was also yellowed and dropping seeds, while the ordinary form of the species still remained green, with flowers and many buds. It would be interesting to note whether this difference in time of fruiting holds throughout its range. It certainly is evident in the Hollister collections, no. 4297 and 4298, of *Eastwood & Howell.* In spite of the fact that the only distinguishing characters are those of degree, these observations indicate to me that *Lepigonum tenue* of Greene should be retained in varietal rank.

Lepigonum neglectum var. *tenue* Kindb. Synop. Lepig. 6. (1856) is based upon a collection, "Ad littora maris Galliae prope Calvados," by *Lenormand* and is characterized briefly by Kindberg as having small flowers with greatly protruding capsules. Since the *Lenormand* collection cannot be found either in Uppsala or in Stockholm, nothing can be done at present to clear the situation—the use of the same epithet for groups evidently with the same characterization. The situation is further complicated by the fact that *L. neglectum* and *L. marina* are synonyms. It seems doubtful that the two varieties can be the same.

14. S. ECHINOSPERMA Čelak. (PLATE 590, FIGS. 2a–2c and MAP 10). Annual; 1–∞ diffuse stems 5–20 cm. long; *internodes below the inflorescence* sparsely glandular-pubescent, 5–40 mm. long, 0.2–1.4 mm. in diameter; *lower bracts* foliaceous, about 12 mm. long, the upper ones minute, 1–3 mm. long: *leaves* sparsely glandular-pubescent, 8–35 mm. long, 0.4–1.4 mm. broad, usually not fascicled or with only 1 leaf in the axil: *stipules* deltoid, shorter than broad, 1.4–2.4 mm. long: *inflorescence* a lax cyme; the lowest *internodes* 7–25 mm. long, 0.2–0.6 mm. in diameter: *sepals* ovate, sparsely glandular-pubescent, 2.4–3.6 mm. long; *petals* pink or rosy at the apex, 1.6–2.8 mm., as much as 0.2–1.2 mm. shorter than the calyx; *stamens* 1–4; *styles* 3, separated to the base, 0.3–0.4 mm. long: *mature capsules* 3.4–5 mm. long, exceeding the calyx by 0.4–1.8 mm.: *fruiting pedicels* filiform, reflexed or not, 5–11 mm. long: *seeds* 0.5–0.8 *mm. long, deep reddish-brown or nearly black with a silvery tinge,* rounded in outline, *surface always roughened, often sculptured in irregular, vermiform pattern with irregular, short*

ridges between the sculpture, usually with dark brown, glandular papillae which sometimes are hardened, with a broad scarious white wing or not winged.—Arch. Naturw. Land. Boehm. iv. 867 (1881), published as a provisional name *i. e.* in parentheses after *S. rubra* var. *echinosperma* Čelak. *Tissa diandra* sensu Britt. in Bull. Torr. Bot. Club, xvi. 128 (1889), in part, including only the *Lindheimer* and *Drummond* collections, excluding all other collections, which are of *S. diandra* and *S. atrosperma*, *q. v.*, non *Arenaria diandra* Guss. (1827); sensu Howell, Fl. Nw. Coast, 89 (1903), in part, including only the Texan plants, non *Arenaria diandra* Guss. (1827). *S. diandra* sensu Robins. in Proc. Am. Acad. xxix. 310 (1894), in part, including Texan plants only, non *Arenaria diandra* Guss. (1827). *S. salsuginea* var. *bracteata* Robins. in Gray, Synopt. Fl. i. 251 (1897), in part, including the Texan plants only. *Tissa bracteata* (Robins.) Small, Fl. Se. U. S. 418 (1903), in part, including Texan plants only.—North America: introduced in Texas and Alabama from the Old World. Alabama: low brackish, sandy seashore of Westfowl River, *Mohr*, April 7, 1870 (U. S.). Texas: Galveston Co.: Galveston, *Lindheimer*, 1843 (G., B., one of the Berlin sheets marked *Lepigonum neglectum* by Kindberg, 1861); beach, Galveston, *Joor*, April 19, 1875 (U. S.); Galveston Island, *Tharp* 2891, May 30, 1924 (U. S.). Brazos River, *Drummond*, 1833 (G., type of *S. salsuginea* var. *bracteata* Robins., K.). Nueces Co.: Corpus Christi, *Heller* 1413, March 5–12, 1894 (G., U. S., U. C.); Corpus Christi, *Benke* 5360, March 30, 1930 (G.). Padre Island (sw. shores of Texas), *Tharp* 5544, March 16, 1929 (U. S.). Pecos Co.: moist fine sands along Pecos River, near Pecos, *E. J. Palmer* 34027, May 18, 1928 (G.). Without definite locality, Texas, *Marel* (?), March (B.).

As is evident in the synonymy, this species has been included in *S. diandra,* which is also introduced, although only in the northwestern states and perhaps farther east. These two plants are very similar in habit, although *S. echinosperma* has the larger capsules not globose. *S. echinosperma* is easily distinguished, furthermore, by larger, brown, rounded seeds which are never so deeply sculptured as are usually the black, pyriform seeds of *S. diandra.*

15. S. congestifolia I. M. Johnst. (Plate 590, fig. 4a–4b and map 11). Suffruticose perennial: *tap-root* fibrous, with a soft, rough bark, extending deep into soil, up to 5 mm. thick: *caudex* heavy, branched or unbranched, bearing many (often 10–20) small crowded stems, 6–20 cm. long; *internodes of the stem below the inflorescence* usually *very short,* 1.5–8 mm. long and less than 1 mm. in diameter: *leaves densely fascicled, filiform,* strongly mucronate, sparsely glandular-pubescent, *falcate,* 3–10 mm. long, 0.3 mm. wide; *stipules white,* connate toward the base, *finely lacerate to nearly two thirds the length, giving the plant a silvery cast,* 3–5 mm. long: *inflorescence an open cyme, with much longer internodes, erect, high above leafy parts,* with minute, foliaceous *bracts*

1–3 mm. long: *sepals* ovate-lanceolate, glandular-pubescent, 5–5.5 mm. long; *petals* white or rosy-tinged, ovate, 4.5–5.7 mm. long; *stamens* 10; *styles* 3, 1–1.5 mm. long, united in young flowers and dividing probably to the base as flower matures: *capsules* (mature or nearly so) 5–6 mm. long, equal to or slightly exceeding the calyx: *fruiting pedicels* filiform, not reflexed (?), the lower 10–23 mm., usually 12–15 mm. long: *seeds* not winged, mature ones unknown.—Contrib. Gray Herb. lxxxi. 90 (1928); Macbride, Field Mus. Pub. Bot. xiii.—Fl. Peru Pt. ii, no. 2, 630 (1937).—South America: found only in Peru near Mollendo, on arid hills of the coast. Peru: Prov. Islay: Dept. Arequipa: Mollendo: open places in the green belt, hillside back of port, *Johnston* 3567, October 16, 1925 (G. type, U. S., F. M.); desert hills after October rains, *A. S. Hitchcock* 22415, November 17, 1923 (U. S.); carpeting arid hills near ocean, fog vegetation, *Ynes Mexia* 04166, November 16, 1935 (G., U. C.).

This is a very striking and beautiful species, different from all the others in its congested, falcate leaves just protruding from silky masses of lacerated stipules and its large flowers in tall inflorescences. There is need of fully fruiting material for complete knowledge of the species.

16. S. arbuscula (Gay) I. M. Johnst. (Plate 590, figs. 5a–5e and map 12). A *small perennial shrub: caudex* very heavy, ligneous, branched, bearing many erect or diffuse, rigid stems 6–30 cm. tall, becoming woody below, as much as 1 cm. thick, covered with a rough bark, scrubby with persistent, shrivelled leaves, stipules, and small, lateral branches: *internodes of the young branches below the inflorescence* densely covered with spreading, glandular pubescence, very much congested or as much as 1–16 mm. long, 0.4–0.8 mm. in diameter: *leaves fascicled,* glabrous or sparsely glandular-pubescent, not mucronate or very shortly so, *very fleshy,* 2–12 mm. long, 0.6–3 mm. broad; *stipules* conspicuous, shining, broadly lanceolate, not much longer than broad, *apex erose sometimes to as much as one-half its length,* 2.5–5 mm. long: *inflorescence a compact cyme; internodes crowded together* or as much as 4 mm. long, heavily glandular-pubescent; *bracts* wanting or foliaceous and as much as 2 mm. long: *sepals* linear, usually glabrous, sometimes glandular-pubescent at the base, 2.4–5 mm. long; *petals* white, ovate, 1.8–4 mm. long, as much as 0.4–1.6 mm. shorter than the calyx; *stamens* 10; *styles* 3, separated to the base or nearly so, 0.8–1.2 mm. long: *mature capsules* 1.6–3.6 mm. long, equal to or more often as much as 0.2–1.8 mm. shorter than calyx: *fruiting pedicels* filiform, glandular-pubescent, not reflexed, 1–3 mm. long: *seeds brown or nearly black, rounded at apex, shining, usually deeply sculptured in interwoven, vermiform pattern, occasionally with faint sculpture most noticeable near point of attachment of seed,* 0.6–0.8 mm. long, *not winged.*—Contrib. Gray Herb. lxxxv. 40 (1929). *Paronychia arbuscula* Gay, Fl. Chil. ii. 520 (1846); Reiche, Fl. Chile,

i. 211 (1896). *Arenaria teretifolia* Philippi, Fl. Atac. 10 (1860). *A. lignosa* Philippi, l. c. *S. lignosa* (Philippi) Rohrb. in Linnaea, xxxvii. 244 (1871–73); Philippi in Anal. Univ. Chil. lxxxi. 764 (1892). *S. fruticosa* Philippi, l. c. 763 (1892). *S. teretifolia* (Philippi) Philippi, l. c. lxxxi. 764 (1892). *Tissa lignosa* (Philippi) Reiche, Fl. Chile, i. 198 (1896). *T. teretifolia* (Philippi) Reiche, l. c. (1896).—South America: along the sea coast of Chile, in the provinces of Antofagasta, Atacama, and Coquimbo. Chile: Prov. Antofagasta: Dept. Taltal: sandy and rocky point on slope just back of Punta Reyes, vicinity of Aguada de Miguel Diaz ca. 24° 35′ S., *Johnston* 5357, December 1–4, 1925 (G., marked "flowers like type of *A. lignosa* Philippi in size and shape of calyx" by the collector, the plant with very small capsules, petals, and reflexed sepals); local in crevices on very dry granitic outcrop in a small quebrada just south of Posado Hidalgos, *Johnston* 5659, December 14, 1925 (G., U. S., seeds present); Cachinal de la Costa in Deserto Atacama, *Philippi*, December, 1853 (Santiago, photo. and fragment in G., type of *Arenaria lignosa* Philippi, sepals linear, reflexed, longer than the capsule); Cachinal de la Costa in Deserto Atacama, *Philippi* 170 (Santiago, photo. and fragment in G., type of *Spergularia teretifolia* Philippi, with short, broad, blunt sepals); Desert of Atacama, *Philippi* 65 (B., with short, narrow, reflexed sepals, marked *Arenaria lignosa*). Prov. Atacama: Dept. Chanaral: small stout bush 2–6 dm. tall, on hillsides and about rocks near the sea, hills back of El Barquito, vicinity of Puerto de Chanaral, 26° 23′ S., *Johnston* 4753, October 28–29, 1925 (G., U. S., seeds present). Dept. Copiapo: about rocks and in sand, 1–1.5 dm. tall, on a small point just north of Caldera ca. lat. 27° 3′ S., *Johnston* 5066, November 22, 1925 (G., U. S., seeds present, 2 of the 3 plants with short, broad sepals, not reflexed, marked "a fair match for type of *A. teretifolia* Philippi" by Dr. Johnston); same locality, *Johnston*, 6289, November 22, 1925 (G., with long sepals); vicinity of Caldera, *Gigoux* (G., two sheets, one not dated and one dated 1922); Caldera, *Werdermann* 385, November, 1924 (G., U. S., N. Y., F. M., B., Cal. Acad., U. C., over-mature); Morro de Copiapo se sur del puerto de Caldera, *Espinosa*, November 9, 1936 (D. S.), with long sepals, no seeds). Dept. Freirina: alt. ca. 20 m. Huasco, *Werdermann* 132, November, 1923 (G., F. M., B., Cal. Acad., U. C.); Huasco, *Jaffuel* 1166, November 2, 1930 (G., seeds present, sepals short and broad); Huasco, *Philippi*[1] (Santiago, photo. and fragment in G., type of *Spergularia fruticosa* Philippi, sepals very long and broad, far exceeding the capsule). No definite locality: Desert of Atacama, *Morong* 1172, September and October, 1890 (G, U. S., seeds present on G. spec., some plants with short broad sepals, others with them much longer); Atacama, *C. Porter* (K.). Prov. Coquimbo: Dept. Ovalle: Limari, Frai Jorge, *Werdermann* 894, November, 1925 (G., U. S., N. Y., F. M., B., Cal. Acad., Arnold Arb., U. C., seeds on B. spec. only, very long sepals);

[1] Date from Anal. Univ. Chile, lxxxi. 763 (1892), is October, 1866.

Loma, Frai Jorge, *C. & I. Skottsberg* 855, December 8, 1917 (N. Y.), seeds present; Coquimbo, ded. *Philippi*, 1888 (B., marked *Spergularia fruticosa*); Chile, no locality on label,[1] *Cl. Gay* (K., G., TYPE COLLECTION of *Paronychia arbuscula* Gay, in poor condition).

There is a great range of variation among the plants cited and described above. There are plants with short, broad, blunt sepals about equal to the capsule, as in the type of *Arenaria teretifolia* Philippi, and there are others with long blunt sepals greatly exceeding the capsule, as in the type of *Spergularia fruticosa* Philippi. The type of *Paronychia arbuscula* Gay has the "calyx lobes oblong-ovate, very glabrous, equal to or slightly exceeding the membranaceous petals." Often plants may have linear, reflexed sepals, as in the type of *Arenaria lignosa* Philippi. Though most of the collections lack seeds, those seen show no fundamental variation. It should be said, however, that seeds of plants with linear, reflexed sepals have never been seen. In spite of the above variations it seems quite possible that they all belong to the same taxonomic unit, for they all have the distinctive, shrubby habit, the same type of stipule, number of stamens, type of style, etc.

(*To be continued*)

GRASSES AND SEDGES OF WOODSTOCK, VERMONT.—In 1932, in reviewing Miss E. M. Kittredge's "Ferns and Flowering Plants of Woodstock,"[2] I commented with regret on the omission of the grasses and sedges. This omission has now been repaired by the publication[3] (as before, under the patronage of Miss Elizabeth Billings) of a 27-page pamphlet listing the members of those families known to occur in the Woodstock area. Like its predecessor, it is very well printed on excellent paper; the quality of its poetical quotations is as high as ever; and the identification, cataloguing and comment have been done with like care and thoroughness.

Mechanically, it is not quite so good. Pages 20 and 21 have been transposed; page 19 is set in italic type when roman would seem to have been required; and a number of minor errors (such as the strange transformation of Persoon into "Jessu" on page 14) have managed to run the gauntlet of proofreading. The statement that until 1934 *Carex castanea* was known from no other station east of the Green Mountains is, as phrased, misleading. It is probably true of the latitude of Woodstock, but *C. castanea* was reported in Kennedy's Flora of Willoughby in 1904 and is not uncommon in northeastern Vermont. However, if it be not taken as infallible in minutiae (and what work can be?), this list well fulfills the functions of a regional flora—to serve as a guide and stimulus to local collecting and to

[1] "Sandy places in Prov. Coquimbo."—Gay, Fl. Chile, ii. 520 (1846).

[2] RHODORA, xxxiv. 56 (1932).

[3] KITTREDGE, E. M. *Grasses and Sedges of Woodstock, Vermont* (with foreword by Elizabeth Billings). The Elm Tree Press, Woodstock. 1939.

furnish useful phytogeographic records. It worthily supplements and completes Miss Kittredge's previous publication.—C. A. W.

Ludwigia microcarpa in Missouri.—The southern coastal plain species, *Ludwigia microcarpa* Michx., has been recorded as ranging from North Carolina to Florida and Louisiana.

Recently the author was collecting in Oregon County, southern Missouri, and found this species locally abundant in a swampy meadow in a valley along the spring branch of Greer Spring, near Greer. This swampy meadow was formed by the seepage of a small spring, locally known as "Hatcher's Spring" which rises in the valley of Greer Spring branch, and joins the latter after a flow of fifty feet. *Ludwigia microcarpa* was associated with *Panicum agrostoides*, var. *ramosius* (Mohr) Fern., *Eleocharis calva* Torr., *Fuirena simplex* Vahl, *Parnassia grandifolia* DC., *Galium tinctorium* L. (*G. Claytoni* of Gray's Manual, 7th edition), and *Eupatorium perfoliatum* L.

Its occurrence here represents a northern extension of range for the species of several hundred miles and places it within the range of Gray's Manual. Specimens of the plant have been deposited in the Gray Herbarium, Missouri Botanical Garden Herbarium, and the herbarium of Field Museum. The data are as follows: swampy meadow along Greer Spring branch, 1 mile north of Greer, Oregon County, Missouri, Aug. 26, 1939, *J. A. Steyermark 27987*.—Julian A. Steyermark, Field Museum of Natural History.

A pilose Variety of Diervilla Lonicera.—

Diervilla Lonicera Mill., var. **hypomalaca**, var. nov., foliis subtus dense pilosis. Ontario: Bear Island, Temagami Forest Reserve, June 28, 1930, *P. V. Krotkov*, no. 5606; Tobemory, Bruce Co., June 22, 1933, *Krotkov*, no. 7808; edge of beach, Pike Bay, Bruce Peninsula, July 17, 1935, *A. S. Pease & E. C. Ogden*, no. 24,852 (type in Gray Herb.). Wisconsin: near Garrett Bay Inn, Ellison Bay, Door Co., July 9, 1918, *Milton T. Greenman*, no. 20.

Typical wide-ranging *Diervilla Lonicera* has the leaves glabrous or at most a little setulose along the midrib beneath. Var. *hypomalaca*, known only from a limited area in the range, is striking on account of the dense white pilosity of the lower surfaces of the leaves.—M. L. Fernald.

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Vol. 42. **May, 1940.** **No. 497.**

SUGGESTIONS FOR COLLECTORS

John M. Fogg, Jr.

Several articles have appeared during the last few years urging that collectors of vascular plants exercise greater care in the preparation and documentation of their field specimens.[1] That these suggestions have been seriously taken to heart and rigorously put into practice by all of us is a consummation which, however devoutly it may be desired, probably lies nearer to the millenium than to the present. Perhaps the very multiplicity of the rules prescribed may, in some measure, defeat the results they are designed to accomplish. Even the conscientious collector, feeling himself incapable of obeying all of the "don'ts" and "musts," may adopt a "what's the use" attitude and lapse into his former indifferent habits.

Yet it is a sad fact that all herbaria contain far too many specimens which have little or no value for the serious student, merely because the collector neglected to procure representative portions of the plant or failed to supply on his label such vitally important information as the color of the corolla or the fruit when fresh. All too frequently such an inadequate sheet will be the only one from an area of strategic significance, yet the monographer or phytogeographer will be forced to ignore it because of its imperfections. I can speak feelingly on this subject as I am at present engaged in a study of the flora of

[1] *Collecting, Drying and Mounting of Plant Specimens.* J. Lunell. Amer. Midl. Nat. **5**: 191 (1918). *The Preparation of Botanical Specimens for the Herbarium.* I. M. Johnston. Arnold Arb. 1939. *Plant Collecting Manual for Field Anthropologists.* F. R. Fosberg. Philadelphia, Pa., 1939.

Pennsylvania which involves the careful examination of something like two hundred thousand sheets from five important herbaria. A distressingly large number of these specimens can not be cited because their poor quality makes satisfactory identification impossible. Some are too immature, some lack the basal parts, others are sterile, while in still others the reproductive structures are too poorly displayed or their nature too inadequately noted on the label to permit them to be studied effectively. These are just a few of the deficiencies which render much herbarium material practically useless. A great many other sheets have to be ignored in any floristic work because the locality data supplied on the label are too ambiguous or inaccurate. But that is another matter, one with which I am not at present concerned.

It has long seemed to me that if the average collector had in mind a selected list of the most necessary chores he would be more likely to accomplish them than if the ideal of absolute perfection were held up before him. An example or two may serve to make clear what I mean.

We have all been taught, and continue to teach those who follow us, that to be acceptable a specimen of an herbaceous plant should include, whenever possible, the complete underground system. In actual practice, however, many collections are made in which only the tops of the plant are secured or in which the roots have been incompletely lifted or imperfectly cleaned. It is not enough merely to loosen the soil with the point of a pick or trowel and then pull; every effort should be made to remove the base of the plant intact from the ground and then to wash it clean so as to display all the subterranean structures. Now it must be admitted that perhaps the majority of our native plants can, according to the present manual treatments, be identified in the absence of their underground parts. And certainly no conscientious botanist would encourage the extermination of rare and localized species by insisting that their roots be destroyed. Nevertheless it is a fact that in an increasing number of genera important diagnostic characters are found to reside in the roots and rhizomes. Recent revisions of such critical groups as *Scleria*, *Streptopus* and *Rhexia* have conclusively demonstrated that a thorough understanding of the

specific entities involved can be gained only from material in which the basal organs are fully exhibited. The number of such genera increases yearly and an attempt will be made below to emphasize only the more outstanding ones.

Another type of effort concerns the recording of observations which can be made only in the field or on fresh material. No taxonomist would deny the fundamental usefulness of notes dealing with, let us say, the color and markings of the corolla. Yet lamentably few labels bear such data. Perhaps collectors feel that the approximately 5000 species in the Gray's Manual range can be recognized with sufficient ease and certainty to render unnecessary the noting down of these facts. They allow the dried specimen to speak for itself and in many instances its eloquence justifies their confidence in it. In countless other cases, however, the pressed plant is incapable of saying for itself what we could so easily have said about it on the label, had we taken the trouble. Two examples must suffice to illustrate this point. Our two native eastern species of *Impatiens* can be readily distinguished on the basis of the color of their corollas, yet I venture to say that not more than one collector in ten records this evidence on his label. Perhaps the remaining nine comfort themselves with the thought that there is a second character in the relative length of the spurs which will serve to separate these two plants when carefully pressed, and so long as no subspecific categories were recognized this view may have been warranted. But in 1925 Weatherby published a paper calling attention to several distinct color forms in *I. biflora,* the recognition of which depends primarily on the pattern of marking on the corolla.[1] The student of plant distribution would like to know whether these forms are of mere sporadic occurrence or whether they have separate geographic ranges. Unfortunately, these answers will not be forthcoming until such time as collectors have learned to make such observations in the field and transcribe them on their herbarium labels.

Or take, as a second instance, the structure and color of the flowers of certain Orchidaceae. Anyone who attempts to determine from dried material the species of such genera as *Corallorhiza, Spiranthes* and *Habenaria* realizes how important is a

[1] Rhodora **21**: 98 (1919).

knowledge of the length and shape of the spur and the nature and markings of the lip. This information may of course be partly gained by boiling up the dried flowers. But collectors would confer a real and time-saving service to students if they would only take the slight pains necessary to ascertain and record these facts while they have the fresh specimens in hand.

Perhaps it can not reasonably be expected that an active field botanist, one, say, who collects two or three thousand numbers during a growing season, will have time and energy to make such notes on every sheet he prepares. It is therefore the function of this article to call attention to those particular groups in which, at least in the light of our present knowledge, this kind of observation will prove most helpful to the monographer and the student of distribution.

Before passing to the individual examples, however, there is one general matter which appears to me of such signal importance that it deserves separate and special emphasis, and that is the collecting of extra flowers and fruits. Whenever possible, it is highly desirable to secure additional material of the reproductive structures for subsequent dissection and study. In the case of grasses, sedges, rushes and many other groups it is a simple matter to procure and place in press with the specimen a number of inflorescences or tops from neighboring plants. Great care should of course be exercised to insure that these are taken from members of the same colony or the same undoubted species, in order that no mixture occurs. When the species is fruticose or arboreal, additional sprays or individual flowers can readily be removed from the same plant and laid in press. These supplementary parts can eventually be placed in pockets affixed to the mounted sheet and an abundance of material for study will thus be available without having to destroy or mutilate the herbarium specimen.

The following examples are arranged in systematic sequence and although the list is designed primarily for field work in eastern temperate North America it may in large measure be applied to other sections of the country. Grateful acknowledgement is due my friend and companion on many field-trips, Mr. Bayard Long, who has scrutinized these "agenda" and suggested several pertinent additions. Professor M. L. Fernald and Mr.

C. A. Weatherby have likewise made valuable suggestions which are incorporated herein.

Polypodiaceae. There is evidenced on the part of collectors an increasing tendency to content themselves with but a single leaf when pressing ferns. This practice may be condoned in the case of some of the larger forms, but only if an attempt is made to secure a sporulating frond and to lay it out so that the sori are clearly displayed. In the case of dimorphic types both sterile and fertile fronds should be collected. In both instances it is well to get the entire stipe, since diagnostic characters may reside in the lowermost scales. In such genera as *Athyrium* (especially *A. angustum* and *A. asplenioides*) and *Cystopteris* the nature of the rootstock has been stressed in recent revisions; it should therefore be collected or notes made on its habit. In *Dryopteris spinulosa* and closely related species it is vitally important to arrange the lower pair of pinnae so that the relative lengths of the pinnules may be clearly seen.

Lycopodium. The separation of *L. tristachyum* and *L. complanatum*, var. *flabelliforme* is greatly facilitated by a knowledge of the position of their rootstocks. These should either be collected or a note made as to whether they are deep-seated or superficial.

Isoetes. Most herbaria contain far too many sterile specimens of this genus. For critical study material possessing megaspores, and in some cases microspores, is essential. Notes on habitat, and whether the plant was emersed or submerged, will prove helpful. A highly praiseworthy practice is that of splitting several of the plants vertically and mounting them so that the opened inner half is exposed. This will reveal the important structure of the inner side of the leaf-base without requiring the mutilation of the rosette, as would otherwise be the case. All detached sporophylls should be saved and pocketed.

Picea. Differentiation between *P. rubra* and *P. mariana* is often difficult and, in the case of much herbarium material, practically impossible. Mature cones are of utmost value, as are notes on the color of the fresh foliage.

Pinus. Here, likewise, cones are often needed for satisfactory identification. In the case of tall trees, they may frequently be found on the ground directly underneath, and may with reasonable safety be added to the specimen. Notes should always be provided on the character of the bark and the height of the tree.

Najadaceae and all small-leaved floating aquatics must be carefully floated out on sheets of white paper. This can readily be done in the field, if sheets of plain paper are carried in the press, or at home by utilizing a basin or pan of water. Con-

siderable care may be needed to avoid mounting two or more species on the same sheet. In the linear-leaved species of *Potamogeton* stipules have been found important and ought, when present, to be clearly displayed.

Elodea (Anacharis). Recent treatments of this genus have stressed floral characters. Botanists who have ready access to localities where these plants grow would do well to defer their collecting of them until such season as flowers are present.

Gramineae. Grasses are usually easy to collect and press, and there is no excuse for making poor specimens. Many sheets err in being too copious. It is better in many densely tufted species to divide the plant (taking care to note on the label "Portion of clump") than to crowd the sheet so that the inflorescences may be poorly shown and such diagnostic characters as the ligules completely obscured. At least some of the leaves should be pressed out perfectly flat, so that their width may be measured. If the specimen itself does not show whether the plant was cespitose or stoloniferous, this information may be noted on the label. As mentioned above, extra tops in this and the next family are highly useful.

Cyperaceae. In many sedges the base of the plant is of great importance and an effort should be made to lift it intact. Here again there is usually an advantage in not having the sheet too full. The sheath is often of critical significance, especially in *Carex*, and in good specimens some of the culms will be so arranged as to display it. Collectors will do well to refrain from gathering *Carex* before the perigynia have filled out; herbaria are already too well supplied with immature specimens which can never be satisfactorily named. Overripe material is almost as undesirable, although in this case the disintegrating spikes can often be salvaged and placed in pockets.

Arisaema. Recent work has shown the character of the corm, and whether or not it produces offsets, to be helpful in separating species. Notes are needed as to whether the under side of the leaflet is green or glaucous and on the shape and coloration of the spathe. The characteristic fluting of the spathe of *A. Stewardsonii* is usually not discernible in the pressed specimen and the student is always grateful when this information is supplied on the label.

Commelinaceae. Observations on the color of the petals and the anthers are very acceptable in *Tradescantia* and *Commelina*. In both these genera the flowers can be successfully preserved by placing them between folds of waxed paper.

Juncus. Many of the points mentioned under grasses and sedges apply also to the rushes. With a little care in the laying out of the plant the structure of the ligule, which is all-important in some species, can be brought into view. Everyone who has

attempted to identify our eprophyllate rushes has had difficulty with specimens in which it was almost impossible to determine whether the number of stamens was 3 or 6. This is a matter which can often easily be settled in the fresh condition and a note to this effect will save much time spent in boiling up dry flowers.

Allium. Comments on the nature of the bulb-coat (whether membranous or reticulated) are in order here. Even when the bases are carefully collected, the bulb-coats frequently fall apart and are lost before the plant is mounted. Since the leaves may be either flat or terete, and this is not always easily seen in the mounted specimen, this too should be mentioned.

Erythronium. The color of the perianth merits a note. In cases where the relative lengths of the stigmas may not be shown, color provides the best differentiation between *E. americanum* and *E. albidum.*

Smilax. If the specimen is collected from the top of the plant, the label should tell whether the main axis was prickly or unarmed. A statement on the color of the fruit is always welcome.

Streptopus. Fassett's recent revision of this genus stresses the nature of the basal system in separating the varieties of *S. roseus.*

Dioscorea. The distinction between *D. villosa* and *D. quaternata* is brought out more clearly by collecting typical portions of the main stem, rather than just the tips. In both, the leaves may be alternate near the top of the plant, but lower down the axis the verticillate phyllotaxy of the latter species is clearly seen. The rhizomes, too, are strikingly different.

Iris. Here, again, the use of waxed paper is necessary in order perfectly to preserve the perianth.

Sisyrinchium. While the temptation to collect these attractive plants in flower is great, it should be remembered that the taxonomic usefulness of fruiting material is much greater.

Orchidaceae. Information concerning the shape, color and markings of the lip (labellum) is well nigh indispensable in many orchid genera, e. g., *Habenaria, Spiranthes, Listera, Corallorhiza.* As a specific instance may be mentioned the very close resemblance between *Habenaria ciliaris* and *H. blephariglottis.* The conformation of the lip is almost identical in these two species and flower-color furnishes the best character for differentiation. In many dried specimens however, especially older ones, it is impossible to tell whether the corolla was white or yellow and a separation which would have been rendered certain by a simple entry on the label is reduced to guesswork.

Salix. A critical knowledge of willows can, in many cases, be acquired only by collecting flowers, leaves and fruit from the same plant. Since these usually mature at different times it may

be necessary when gathering flowers, to tag the plant so that it may be visited again some weeks later for foliage and fruit. Often old fruiting catkins may be found on the ground beneath the plant. If their origin is not open to question, they may be added to the sheet and a note made on the label, "Collected from ground beneath specimen."

Carya. Either a section of bark should be collected or a note supplied on its character; preferably both. Observations on the height and shape of the tree are also helpful.

Betula. Good specimens of birches will include a strip of bark. An effort should made to procure fruiting catkins and to note the size and shape of the tree.

Quercus. Too few specimens of oaks are provided with fruit. While not always vital for purposes of identification, acorns are essential to the understanding of certain critical species. Facts concerning the height of the tree are also helpful in a few cases, such as puzzling forms of *Q. prinoides* and *Q. Muhlenbergii*.

Celtis. Notes on the color and shape of the ripe fruit, as well as the size of the tree, are of real value.

Caryophyllaceae. The separation of *Lychnis* and *Silene*, often difficult in pressed material, is a simple affair when the number of styles is known; this fact is easy to ascertain and note when the fresh flowers are in hand. A knowledge of whether the flowers are perfect or imperfect will further serve to differentiate *L. alba* and *S. noctiflora*, which are superficially so nearly identical. Notes on corolla-color are also very desirable.

Nuphar (Nymphozanthus). Observations are needed in our spatterdocks on the shape of the petiole in transverse section (whether terete or plano-convex) and on the position of the leaf-blades (whether erect or floating).

Ranunculus. The root-systems are important in certain species.

Thalictrum. Current treatments stress the structure and color of the root system, which should be collected even if a second sheet be necessary for pressing and mounting it.

Arabis. Mature fruit is highly desirable in many species of this genus.

Dentaria. The rootstocks of *Dentaria* may be shallow or deep-rooted and prominently or obscurely toothed or jointed. These facts will bear noting.

Lepidium. The presence or absence of petals is more easily observed in fresh than in dry material and warrants a field-note.

Heuchera. In a recent revision of the alum-roots, we are required to determine whether the hypanthium is actinomorphic or zygomorphic; this is another of those points more readily ascertainable in fresh specimens.

Ribes. The color of the berries is a matter of real interest, especially in the group of the currants (subgenus *Ribesium*).

Tiarella. The presence or absence of stolons is a feature worthy of attention; also, the color of the corolla.

Agrimonia. Good supporting characters are furnished by the roots or rootstocks; only seldom can these be employed in the average herbarium specimen, most of which lack bases.

Amelanchier. Flowers and fruit (especially the partially mature pomes) from the same individual are of prime importance in the study of our service-berries. A comment on the height of the plant is likewise helpful. In the stoloniferous species, even though the bases may not be collected, the habit should certainly be noted. Leaves of the preceding year, collected under flowering shrubs, may prove of real importance.

Crataegus. This is admittedly one of the most difficult genera in eastern North America. An understanding of specific entities here can be gained only by securing flowers and fruit from the same tree; another case of revisiting marked specimens in the field. Observations are required on the approximate number of the stamens and the color of the anthers.

Geum. The color of the petals of the small white- or yellow-flowered species of avens is frequently indistinguishable in dried material.

Pyrus (subgenus Aronia). Notes on the color of the fresh fruit will obviate considerable guesswork in herbarium specimens of *P. arbutifolia* and its variety *atropurpurea*. The color of the anthers is also said to have diagnostic value.

Rosa. Some of the difficulties encountered in the study of this critical genus will be lessened when collectors learn to note on their labels the height of the plant, whether or not it was stoloniferous and whether it was shrubby or climbing. The foliage of the older, mature canes of *Rosa* often differs significantly from that of the vigorous new shoots. Both should therefore be collected; at least it is well to avoid taking only the latter, even though they frequently bear flowers.

Rubus. The foliage of the flowering shoots (floricanes) and that of the sterile ones (primocanes) are usually significantly dissimilar. Orthodox methods dictate that material from both be collected and that the labels bear the symbols "part 1" and "part 2," or some other designation indicating that the two sheets appertain to the same plant. Of fundamental importance, also, is a knowledge of habit, especially in the subgenus *Eubatus*. Professor Fernald kindly furnishes the following manuscript comment. "In collecting, careful note should be made of habit, whether the canes are prostrate and tip-rooting, doming or arching and tip-rooting, or with no rooting tips. Without such careful records identification is most difficult."

Desmodium. The present classification of this genus is based primarily on fruit characters. However, the flowers are proving increasingly useful and material in bloom should not be neglected, especially if care is taken to note color and conformation of the corolla.

Lespedeza. Information on habit, whether trailing or erect, will facilitate the separation of closely related species, such as *L. repens* and *L. violacea*.

Melilotus. Since color is the most conspicuous character differentiating *M. alba* and *M. officinalis* it should be noted before it is lost in drying.

Trifolium. The difficulty occasionally met with in distinguishing *T. hybridum* from *T. repens* in the herbarium may be obviated by a statement concerning habit.

Euphorbia. The shape of the cyathium and the number, color and shape of the glands are of taxonomic significance and ought, whenever possible, to be recorded before the plants are dried.

Impatiens. Notes are helpful on the basic color of the corolla and of the nature of the markings on its throat.

Vitis. Bailey, in his recent monograph of our native grapes, stresses the structure of the carpellate flowers and the color of the pith as seen in longitudinal sections of the branchlets. Young vine-tips are important, as are notes on color and size of fruit.

Parthenocissus. *P. quinquefolia* and *P. vitacea* can be satisfactorily separated only when the inflorescences are faithfully pressed so as to show the method of branching.

Hypericum. Many a student has encountered obstacles in the divisions of the key which call for a knowledge of the number of stamens and the manner of their arrangement into groups. These points may be quickly and accurately established in the fresh condition, but if this is not done laborious boiling up of the dried flowers may be required.

Lechea. The leaves of the basal rosettes of this genus furnish valuable taxonomic characters. This is one of the many important types of material which can be collected during the dormant season, when far too little botanizing is done.

Viola. Everyone who has worked with herbarium specimens of violets has had occasion to deplore the poorly preserved condition of many of the flowers. A serious and genuine effort should be made to press carefully at least a few of the corollas on each plant. This may be facilitated by placing small pieces of moist paper over the opened corollas as the plants are laid out for drying. Notes on flower color will also be appreciated.

Rhexia. This is another genus in which recent studies have focussed attention on the underground system. This is often very delicate and needs to be lifted carefully and washed gently. The petals are fugacious. Properly to display them plants

should be collected and placed in press early in the day. If a vasculum is employed the flowers may be wrapped in waxed paper as early as possible in the morning.

OPUNTIA. Modern treatments of our eastern prickly pears have laid emphasis on habit, thus inviting us to observe and note whether the plant was procumbent or upright. Large clumps should of course be divided for pressing. Individual segments may be split longitudinally and scooped out to expedite drying.

CORNUS. The scientific usefulness of specimens of *Cornus* will be materially increased by noting the color of the branches and the fresh fruit. A section of a branch should be split longitudinally to reveal the color of the pith.

SYMPETALAE. In the case of all tubular-flowered forms it is highly desirable that several extra corollas be collected, split open and pressed out flat so as to show such features as the attachment of the stamens, ratio of limb to throat, etc. This is more useful in genera of the Gentianaceae, Convolvulaceae, Polemoniaceae, Boraginaceae and a few others which will be listed in order.

RHODODENDRON. Statements concerning the height of the plant and the color of the corolla are needed.

VACCINIUM. Of paramount importance in the blueberries is information concerning the height of the plant. Also helpful are notes on the color of the flower and the fruit, especially on whether or not the latter is glaucous.

FRAXINUS. In most herbaria there is a lamentable dearth of good fruiting material of *Fraxinus*. This should be on every collector's list of desiderata. Good characters have recently been demonstrated in the anthers and the calyx.

GENTIANA. Here is one of the most urgent needs for pressing some of the opened corollas flat, as mentioned above.

SABATIA. Complete root-systems are of great importance in this genus.

APOCYNUM. Observation should be made on the shape of the corolla as well as its color.

CUSCUTA. The nature of the petals and their appendages can be best made out in the fresh flower; it is almost impossible to study the flowers of *Cuscuta* by boiling. The shape of the fruit likewise deserves mention.

CONVOLVULUS and IPOMOEA. By slitting and opening out the corolla, the shape of the stigma is disclosed and the distinction between these genera clarified.

POLEMONIACEAE. Here, also, the need for seeing the corolla opened out is great. Importance attaches in *Phlox*, for instance, to the structure of the androecium and the length of the style. A further desideratum in this genus is the complete root system, both in fertile and sterile plants.

Boraginaceae. This is another family in which the opening of the corolla should always be practiced. In some genera it is necessary to observe the accessory lobes which alternate with the petals; these can only be studied by adopting such a procedure.

Lycopus. The structure of the base of the plant is of interest here. The roots need to be carefully dug and cleaned. Observations on the length of the stamens are also in order.

Solanaceae. In the tubular-flowered forms (*Nicotiana*, *Datura*, *Petunia*, etc.) the corolla should be opened and laid out flat. The difficult genus *Physalis* seems to offer possibilities for a better interpretation based on a study of flower-structure.

Scrophulariaceae. Not only should some of the corollas be pressed out open but, since this is one of those families in which remarkable adaptations to insect pollination are seen (especially in the tubular-flowered genera—*Penstemon*, *Gerardia*, etc.) notes on shape, color, bearding and markings of the corolla are desired. In *Gerardia* and allied genera the corollas are fugacious. Fine specimens may be secured by collecting heavily budded individuals and placing them in rolled wet newspapers with their tips toward the light. Early the following morning the flowers will have opened and are then ready for the press.

Galium. Most keys call for a knowledge of habit; the label ought therefore to tell whether the plant was erect or reclining.

Valerianella. Notes on the color of the corolla are advantageous, as are observations on the ratio of the sterile to the fertile cells of the fruit.

Campanula. The shape of the corolla, whether campanulate, rotate, etc., is of interest. This information may be conveyed by a note or by opening and pressing some of the flowers flat; preferably both.

Compositae. In all Composites, especially those with radiate florets, it is highly desirable that at least a few of the heads be very carefully pressed. Some should face upward, so as to show the character of the disc florets, the receptacle, etc., while others ought to be reversed, in order to bring out the nature of the involucre. This may appear difficult in genera with high receptacles, such as *Rudbeckia* and *Heliopsis*, but can usually be accomplished by the use of thick cotton pads placed over the specimen but *outside* the collecting paper.[1] A highly commendable practice is the breaking open of a separate head, the fragments of which may be retained in a pocket. This will greatly facilitate the study of chaff, pappus, achenes, etc.

Antennaria. The procedure suggested under *Gerardia* of placing plants overnight in moistened newspapers will result in good straight flowering stalks in *Antennaria*.

[1] See Fosberg, op. cit. p. 21.

Aster. A good working specimen of *Aster* will possess representative foliage from different levels, not merely dismembered axes or tops. A note on the color of the rays will be extremely helpful.

Bidens. Many herbarium sheets contain a mixture of two or more species of *Bidens*. Great care is needed, especially in collecting the smaller forms, which often occur as widely scattered individuals, to secure a uniform series under each number. Mature fruit is as important as flowers in this genus.

Erigeron. Greater attention needs to be paid to the lower leaves and basal rosettes.

Eupatorium. In *E. purpureum* and related species observations are required on flower-color, approximate number of florets in a head and whether the stem is solid or hollow.

Helianthus. If the specimen fails to show whether the cauline leaves are alternate or opposite, this fact merits a note on the label. The underground parts will probably be given greater weight in future treatments of sunflowers.

Lactuca. Mature fruit is of prime importance in this genus and useful corroborative evidence is contributed by the color of the florets.

Senecio. Basal leaves and rosettes are of special interest in this difficult genus.

Solidago. As in *Aster*, with additional attention directed to the basal rosettes and stolons, when present. Excellent taxonomic characters have recently been developed on the basis of the subterranean organs.

Herbarium, University of Pennsylvania.

Albino Forms of the Beach Pea.—

Lathyrus japonicus Willd., var. aleuticus (Greene) Fernald, forma **albinus**, f. nov., corollis albidis. Type from Labrador: Northwest River, Lake Melville, July 30, 1921, *R. H. Wetmore*, Nat. Herb. Can. no. 102,994 (in Gray Herb.).

L. japonicus, var. pellitus Fernald, forma **candidus**, f. nov., corollis albidis. Type from Massachusetts: Osterville, June, 1890, *Susan Minns* (in Gray Herb.).—M. L. Fernald.

SPERGULARIA IN NORTH AND SOUTH AMERICA

Ruth P. Rossbach

(*Continued from page 143*)

17. S. fasciculata Philippi (Plate 593, figs. 1a–1d and map 13). Perennial: *caudex* well developed, branched and knotted, bearing 2–∞ diffuse, often rebranching stems,[1] 10–30 cm. long; *internodes of stem below the inflorescence* 5–35 mm. long, 0.6–1.1 mm. in diameter, shortly glandular-pubescent, only the oldest internodes becoming nearly glabrous by shedding their pubescence: *leaves densely fascicled*, setaceous, glandular-pubescent, usually filiform, but occasionally fleshy, 6–30 mm., usually 10–20 mm. long, 0.2–1 mm., usually 0.2–0.6 mm. wide; *stipules broadly lanceolate, lacerate at the tip or usually for as much as one half their length*, 4.5–7 mm. long: *inflorescence a short, open cyme*, glandular-pubescent throughout; *the internodes* 6–30 mm., usually 9–15 mm. long, 0.2–0.6 mm. in diameter; *bracts* 1–6 mm. long, the upper minute, *sepals* linear-lanceolate, glandular-pubescent, 5–10 mm.,[2] usually 5–8 mm. long; *petals* white, ovate, 4–10 mm., usually 4–6 mm. long, equal to or as much as 1.5 mm. shorter than the calyx; *stamens* 10; *styles* 3, 1.5–2.5 mm. long, *united when young, separating to as much as 0.6 mm. from the apex as flower matures: mature capsules* 5–7 mm. long, equal to the calyx or overtopped by the calyx by as much as 2 mm., or occasionally exceeding the calyx by as much as 1 mm.:[3] *fruiting pedicels* not reflexed, filiform, 6–17 mm. long: *seeds dark reddish brown or nearly black, often silvery, nearly pyriform in outline, deeply sculptured in closely interwoven, vermiform pattern, covered with lighter brown glandular papillae, or not papillose*, 0.8–1 mm. long, *surrounded by a narrow, white or brownish, scarious wing with entire margin less than* 0.1 mm. wide, *or not winged.*—Anal. Mus. Nac. Chile, viii. (Cat. Prael. Pl. Itin. Tarapaca, F. Philippi Lect.) 6 (1891). *Tissa Stuebelii* Hieron. in Engl. Bot. Jahr. xxi. 308 (1895). *T. fasciculata* (Philippi) Reiche, Fl. Chile, i. 197 (1896). *S. Stuebelii* (Hieron.) I. M. Johnston in Contrib. Gray Herb. lxxxi. 90 (1928); Macbride, Field Mus. Pub. Bot. xiii—Fl. Peru, pt. ii. no. 2, 633 (1937). *S. media* sensu Macbride, l. c. 632 (1937),[4] non *Arenaria media* L. (1762). *S. laciniata* Baehni & Macbride ex Macbride, l. c. 631.—South America: in the mountains of Peru and adjacent Chile. Peru: Dept. Libertad: Prov. Huamachuco: roadway between Oyon and Hamade de Peñon, Distr. Cajatambo, *Raimondi* 2110, April, 1868 (B.). Dept. Ancash: Prov. Cajatambo: growing with

[1] Also stems of the last growing season may give rise to new stems at their nodes.

[2] *C. Troll* 3161 has some of the sepals 10 mm. long but a style 2.5 mm., united nearly to apex and 10 stamens.

[3] See *R. S. Williams* 2560 (K., N. Y.).

[4] Cites *Weberbauer* 2751 (?) Ocros, Ancash, which is immature. Macbride's description here seems to be a peculiar combination of the characters of true *S. media* and of the Weberbauer plant, which is *S. fasciculata* (see citations!). A comparison of the diagnostic characters of these two species will show their great dissimilarity.

Cactaceae and Bromeliaceae, 3000–3200 m. alt., Ocros, *Weberbauer* 2751, March 31, 1903 (B., immature). Dept. Lima: Prov. Lima: mountains near Choisica (Lima-Aroyo R. R.) 1700–1800 m. alt., *Weberbauer* 5334, April, 1910 (G., U. S., F. M., immature). Dept. Ica: Bahia de la Independencia, Cerro Quemado, *Weberbauer* 7958, August 5, 1927 (F. M., photo in G., type collection of *Spergularia laciniata* Baehni & Macbride, type not seen). Dept. Ayacucho: Prov. Lucanos: between Sancos and Chaviña, *Raimondi* 10119, September, 1863 (B., sepals equal to the capsule). Dept. unknown: Lomas de Capac, Cerca de Chala, *Raimondi* 10179, November, 1863 (B., immature). Dept. Arequipa: Prov. Camaná: Atiquipa, *Raimondi* 12989 (B., sepals equal to or slightly shorter than the capsule, leaves fleshy). Prov. Arequipa: 8400 ft. alt., Yura, *R. S. Williams* 2560, August 10, 1901 (U. S., N. Y., K., capsule exceeding the sepals); in quarries at the foot of Mt. Misti, Arequipa, *Stübel* 79, February 15, 1877 (B., photo in G., type of *Tissa Stuebelii* Hieron., capsule shorter than the calyx (6 mm.)); dry gravelly river bed, 2500–2600 m. alt., above Arequipa, *Pennell* 13156, April 7–16, 1925 (G., U. S., N. Y., F. M., seeds not papillose); on rocky slopes (2800–2900 m. alt.) above Arequipa, *Pennell* 13247, April 6–16, 1925 (G., U. S., N. Y., F. M., immature); 8000–9000 ft. alt., Arequipa District, *D. Stafford* 354, April, 1934 (K., immature), local name "Estrellita de Cerro"; ravines, Pampa on southern slopes of Mt. Chachani (3050 m. alt.), north of Arequipa, *Hinkley* 10, March, 1920 (G., U. S., F. M., immature); 7600 ft. alt. Arequipa, *G. H. H. Tate* (Ladew Exped.) 1197, June, 1926 (N. Y.). Dept. Tacna: Prov. Tacna: Alto de Tacora, *Juan Isern* (Comision Cientifica de Pacifico) 2277, June 22, 1863 (F. M.). Chile: Prov. Tarapacá: Dept. Tarapacá: 3500–3800 m. alt., Cord. Quebrada de Quipisca, Noasa, *Werderman* 1841, March, 1926 (B., immature, but stamens 10 and style 2.5 mm. long and almost entirely united); between Jaina and Chasmisa, *F. Philippi* (Santiago, type, photo. in G., immature). Prov. unknown: Paychama (3800 m. alt.) *Troll* 3161, March 9, 1927 (B., immature but sepals sometimes 10 mm. long, style united nearly to the apex (2.5 mm. long) and the stamens 10).

This species varies a great deal in comparative length of sepals and capsule. It also varies from a long-noded, sprawling habit, with filiform leaves, to a shorter-noded, more erect habit, with fleshy leaves (*Raimondi* 12989 and 10179). One plant (*Pennell* 13156) has non-papillose seeds but it matches many papillose-seeded plants in habit and all important characters. Occurrence of both types of seeds is another example of a phenomenon common to many of the species of *Spergularia*.

Hieronymus, in his description of *Tissa Stuebelii*,[1] says *S. fascicu-*

[1] Hieron. in Engler, Bot. Jahr. xxi. 308 (1895).

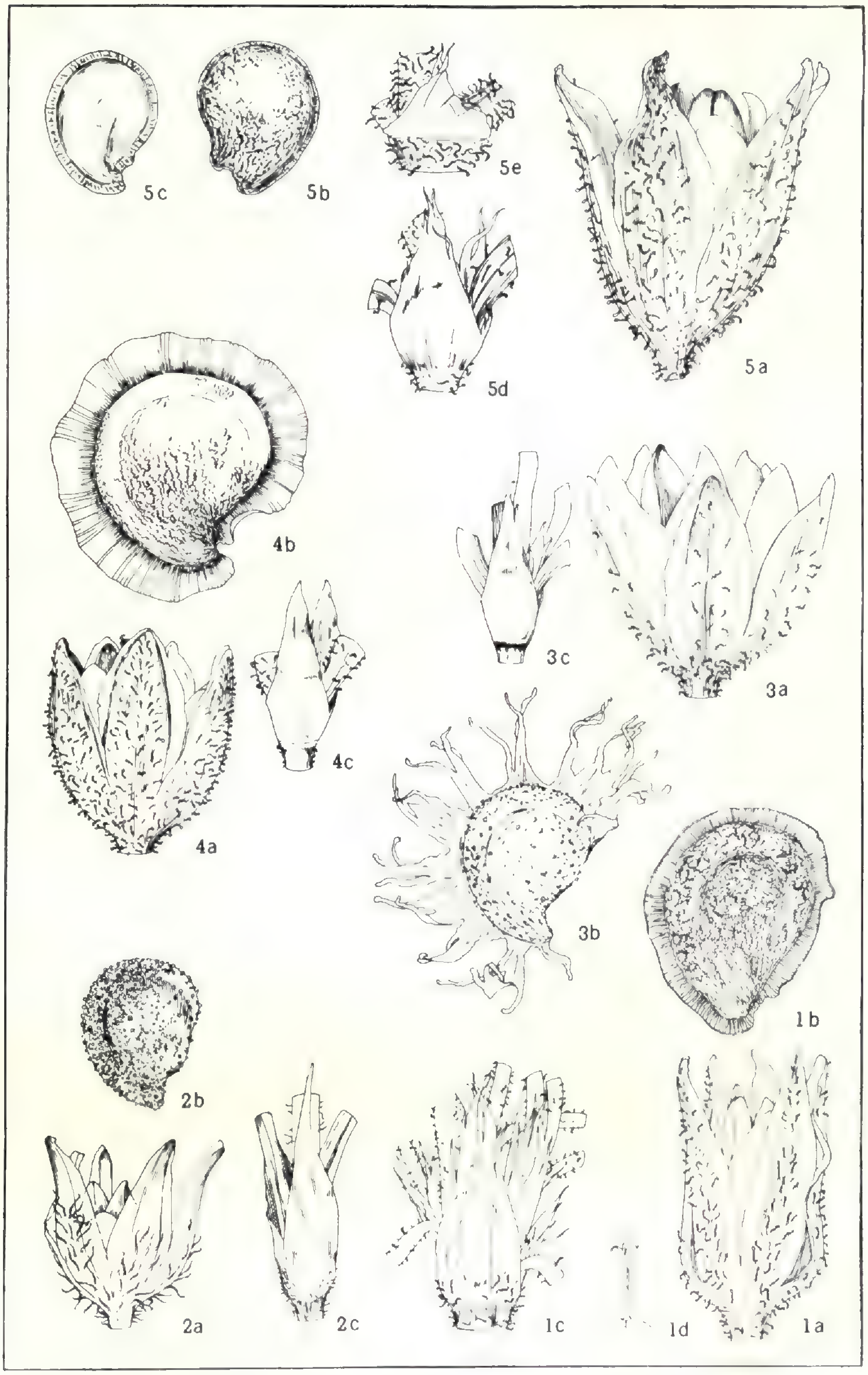
lata Philippi differs from his species in having a covering of short, crowded, erect hairs and a shorter calyx, 5 mm. in length. The type of *T. Stuebelii* is itself covered with pubescence. Since Hieronymus did not have many collections to study, he could not have known that the sepals may vary greatly in length.

Macbride,[1] in his key to the Spergularias of Peru, says *S. laciniata* has the lowest internodes slightly shorter than the leaves, and stipules fimbriate to one half their length, as contrasted with *S. Stuebelii* which has the lowest internodes much exceeding the leaves and the stipules lacerate only above. The length of the internode as compared with that of the leaves is never a diagnostic character in the genus. In this species the stipules vary greatly in depth of laceration, with no supporting characters nor geographic range to separate the extremes.

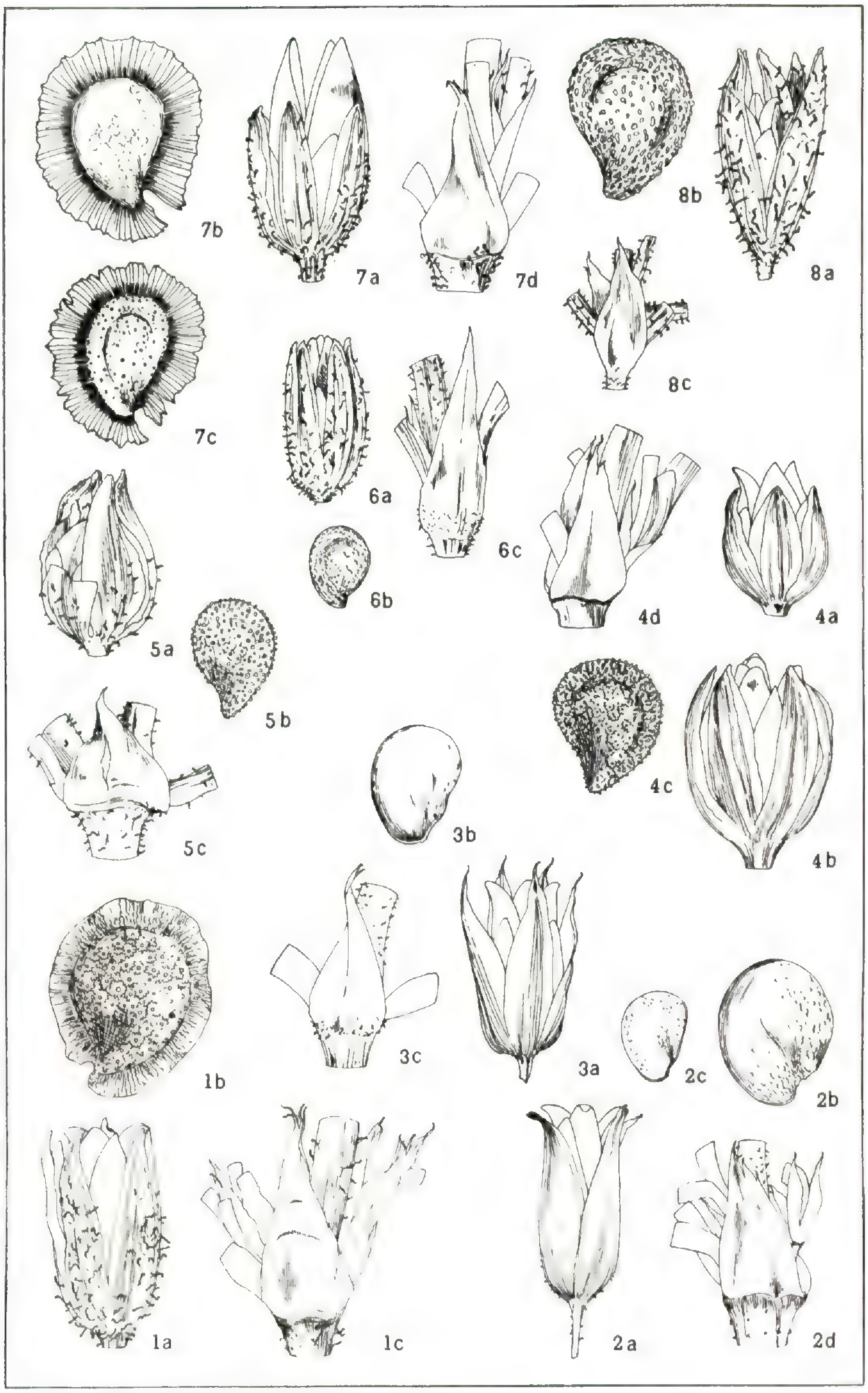
It is unfortunate that all the Chilean specimens are immature, but the flowers all have 10 stamens and the same length and type of style as the Peruvian specimens. The habit, stipules, and leaves are similar.

18. S. andina Rohrb. (Plate 593, figs. 2a–2c and map 14). Prostrate perennial: *caudex* bearing many crowded, slender stems, usually 10–20 or more, 2–8 cm. long; *internodes* of stem below the inflorescence 3–10 mm., usually 6–10 mm. long, less than 1 mm. in diameter: *leaves* not fascicled, mucronate, linear-filiform, glabrous, 7–15 mm. long, 0.4–0.8 mm. wide; *stipules* triangular-acuminate, 3–6 mm. long, connate from the base for 1–2 mm.: *inflorescence compact and leafy,* not sharply differentiated from the vegetative parts, *few-flowered,* the *internodes* shorter, 2–5 mm. long; *bracts* foliaceous, nearly as long as lower leaves: *sepals lanceolate, with heavy, spreading, glandular pubescence on the lower half and without curving tips, hooded at the summit,* 3.5–5 mm. long; *petals* broadly ovate, white or pink-tinged, 2–4 mm. long, 1–1.8 mm. shorter than the sepals; *stamens* 10; *styles* 3, always separated to the base: *mature capsules* 3–4 mm. long, exceeded by the calyx by as much as 0.5–1.2 mm.: *fruiting pedicels* very short, 0.5–2.5 mm. long: *seeds brown, rounded at the summit, covered with deep, close, vermiform sculpture and large, cup-shaped, brown, glandular papillae, giving the surface an incrusted appearance,* 0.6–0.8 mm. long, not winged.—Linnaea, xxxvii. 234 (1871–1873); Macbride, Field Mus. Pub. Bot. xiii—Fl. Peru, pt. ii. no. 2, 629 (1937).—South America: in the Andes of Peru and Bolivia of the region of Lake Titicaca, 3850–4100 m. alt. Peru: Dept. Puno: Azangaro, *Lechler* 1772, June, 1854 (K. type; B.); *Weberbauer,* 456 February 28, 1902 (B.). Bolivia: Dept. La Paz: Achacache, Prov. Omasuyos, reg. alp., 3950 m.,

[1] Macbride, Field Mus. Pub. Bot. xiii—Fl. Peru, pt. ii. no. 2, 631 (1937).



SPERGULARIA: stipule, calyx, capsule and style × 5; seeds × 25.
S. FASCICULATA, figs. 1a–1d. S. ANDINA, figs. 2a–2c. S. DEPAUPERATA, figs. 3a–3c. S. PISSISI, figs. 4a–4c. S. CREMNOPHILA, figs. 5a–5e.



SPERGULARIA: stipule, calyx and capsule × 5; seeds × 25.

S. ABERRANS, figs. 1a–1c. S. STENOCARPA, figs. 2a–2d. S. DENTICULATA, figs. 3a–3c. S. CERVIANA, figs. 4a–4d. S. FLORIBUNDA, figs. 5a–5c. S. PYCNANTHA, figs. 6a–6c. S. VILLOSA, figs. 7a–7d. S. CONFERTIFLORA, figs. 8a–8c.

Mandon 947 (Geneva; photo. and fragm. F. M.); La Paz, *Buchtien* 594, March, 1910 (N. Y., U. S., Leiden) and 594, February 20, 1907 (U. S.).

Rohrbach with his description of this species cites three different collections, *d'Orbigny* 1499, *Mandon* 947, and *Lechler* 1772, from which I choose *Lechler* 1772 as the type. The *d'Orbigny* specimen, which I have not seen, came from Potosi and, if correctly identified, would extend the range much farther south.

19. S. DEPAUPERATA (Gay) Rohrb. (PLATE 593, FIGS. 3a–3c and MAP 15). *Prostrate perennial forming cushions: caudex* bearing many persistent stems, branching repeatedly at each growing season, 5–16 cm. long: *internodes of stem below the inflorescence very short,* 1–7 mm. long: *leaves* fascicled or not, linear-filiform, strongly mucronate, glabrous or sparsely glandular-pubescent, 4–20 mm., usually 7–13 mm. long, about 0.5 mm. wide; *stipules* triangular-acuminate, 2.5–6.5 mm. long: *inflorescence* open, *few-flowered, sharply differentiated from lower parts with foliaceous bracts minute or wanting* and internodes glandular-pubescent, 6–14 mm., usually 8–12 mm. long: *sepals* ovate-lanceolate, often distinctly fleshy, densely glandular-pubescent, scarious-margined, 4–5.5 mm. long; *petals* white, ovate, 4–6 mm. long, equal to or exceeding calyx by as much as 1 mm.; *stamens* 6–10; *styles* 3, 0.6–1.4 mm. long, united or divided partially or completely to the base: *mature capsules* 4.8–5.5 mm. long, equal to or slightly exceeding the calyx by as much as 0.5 mm.: *fruiting pedicels* filiform, usually glandular-pubescent, reflexed or not, the lower 6–15 mm. long: *seeds light brown, rounded in outline, surface lightly roughened or pebbled in casual vermiform pattern, covered with regularly spaced, glandular hairs branched at the tips,* 0.8–1 mm. long, *surrounded by strap-like appendages,* 0.3–0.6 mm. wide, *made by deep lacerations of a papery wing.*—Linnaea, xxxvii. 231 (1871–1873). *Arenaria depauperata* Gay, Fl. Chile, i. 270 (1845). *Lepigonum depauperatum* (Gay) Kindberg, Synop. Lepig. 11 (1856) and Mon. Lepig. 25 (1863). *L. grandiflorum* Kindberg, l. c. 34, t. 3, fig. 22 (1863). *S. grandiflora* (Kindb.) Rohrb. in Linnaea, xxxvii. 235 (1871–73). *S. depauperata* Philippi in Anal. Univ. Chile, lxxxi. (Pl. Nuevas Chil.) 765 (1892), in *obs.*, new combination based on *Arenaria depauperata* but with no reference to literature. *S. tenella* Philippi, l. c. 766 (1892). *S. Rengifoi* Philippi, l. c. 769 (1892). *Tissa depauperata* (Gay) Reiche, Fl. Chile i. 200 (1896). *T. depauperata* var. *tenella* (Philippi) Reiche, l. c. *S. depauperata* var. *tenella* (Philippi) Hauman & Irigoyen in Anal. Mus. Nac. Hist. Nat. Buenos Aires, xxxii. 191 (1923), nom. in synonymy.—SOUTH AMERICA: in the Andes of central Chile and adjacent Argentina in the vicinity of the international boundary from the province of Aconcagua, Chile, south to the province of Rio Negro, Argentina. CHILE: PROV. ACONCAGUA: Uspallata Pass der Chilenischen Hochcordillere, Juncal, in Felsspalten, *Buchtien* 1132, February 13, 1903 (G., U. S., B.). PROV. SANTIAGO: in monte S. Pedro Nolasco,

32 m. s. m., *Carlos Rengifo* (Santiago, photo., fragment and seed in G., type of *Spergularia Rengifoi* Philippi). Prov. Nuble: near Ternias, Chillan, *F. Deltor* 2066, February 15, 1931 (G.); Cordilleren von Chillan, *Felsen* 142, April 19, 1925 (B.); rupium fissuris Pico de Pilque, Andes de Antuco, *Pöppig*, 1828[1] (B., Geneva (photo in F. M.), F. M.; one of the Berlin sheets is marked *Lepigonum grandiflorum* (Poepp.) by Kindberg); without locality, Gay (G., type collection, type in Paris[2]). Prov. Cautin: Cerro Castillo, valle Malaco, Anden Valdivia, *Neger*, April, 1897 (B.). Chile, without locality or date: *Bridges* (B.); *Poeppig* (Leiden). Argentina: Prov. Rio Negro: crevices of rocks, alt. 770 m., cushion-forming, Gobernacion Rio Negro, bridge over Rio Niri Huau, near San Carlos de Bariloche, *James West* 4770, December 15, 1935 (G., U. C.). Prov. Neuquen: growing in the driest rocks, 4500 ft., Liu Cullin, Gob. de Neuquen, *H. F. Comber* 304, December 12, 1925 (K.).

It is difficult to say who is the real author of the name *depauperata*. The label of the type collection in Gray Herbarium has *Arenaria depauperata* Naud. and Kindberg and Reiche both attribute it to Naudin. However, Gay must be considered the author since there is no author cited at the end of the "Cariofilieas" in Gay, Flora Chile, as there is after the "Elatineas," the next family treated.

The name *Lepigonum grandiflorum*, used by Kindberg in 1863 (see Mon. Lepig.) for the *Pöppig* collection, has its source in manuscript and herbarium names of Pöppig and Fenzl.[3] Since the *Pöppig* plants have no mature fruit, Kindberg, using the capsules and seeds as his fundamental key-characters, did not notice the almost exact similarity of *L. grandiflorum* and *L. depauperatum*, which was based upon the *Gay* collection, also immature, and kept up both species. In 1871–73, Rohrbach also kept both species but did not have the Gay collection and expressed his ignorance of *S. depauperata*.

The type specimens of both *S. tenella* and *S. Rengifoi* of Philippi are almost exact matches for the Gay collection.

20. S. Pissisi (Philippi) I. M. Johnston (Plate 593, figs. 4a–4e and map 16). *Perennial, forming large mats*, 7–13 cm. high; new stems branching from nodes of the old; *internodes of stem below the inflorescence very short*, glabrous or covered with very short glandular pubes-

[1] Poeppig was in the region of Antuco, Chile, only from October, 1828, to March, 1829 (Poppig & Endl., Nov. Gen. & Sp. I. Prol. iii. 1835). Therefore "1830," given on the Geneva specimen can not be the date of collection. It presumably is the date of receipt.

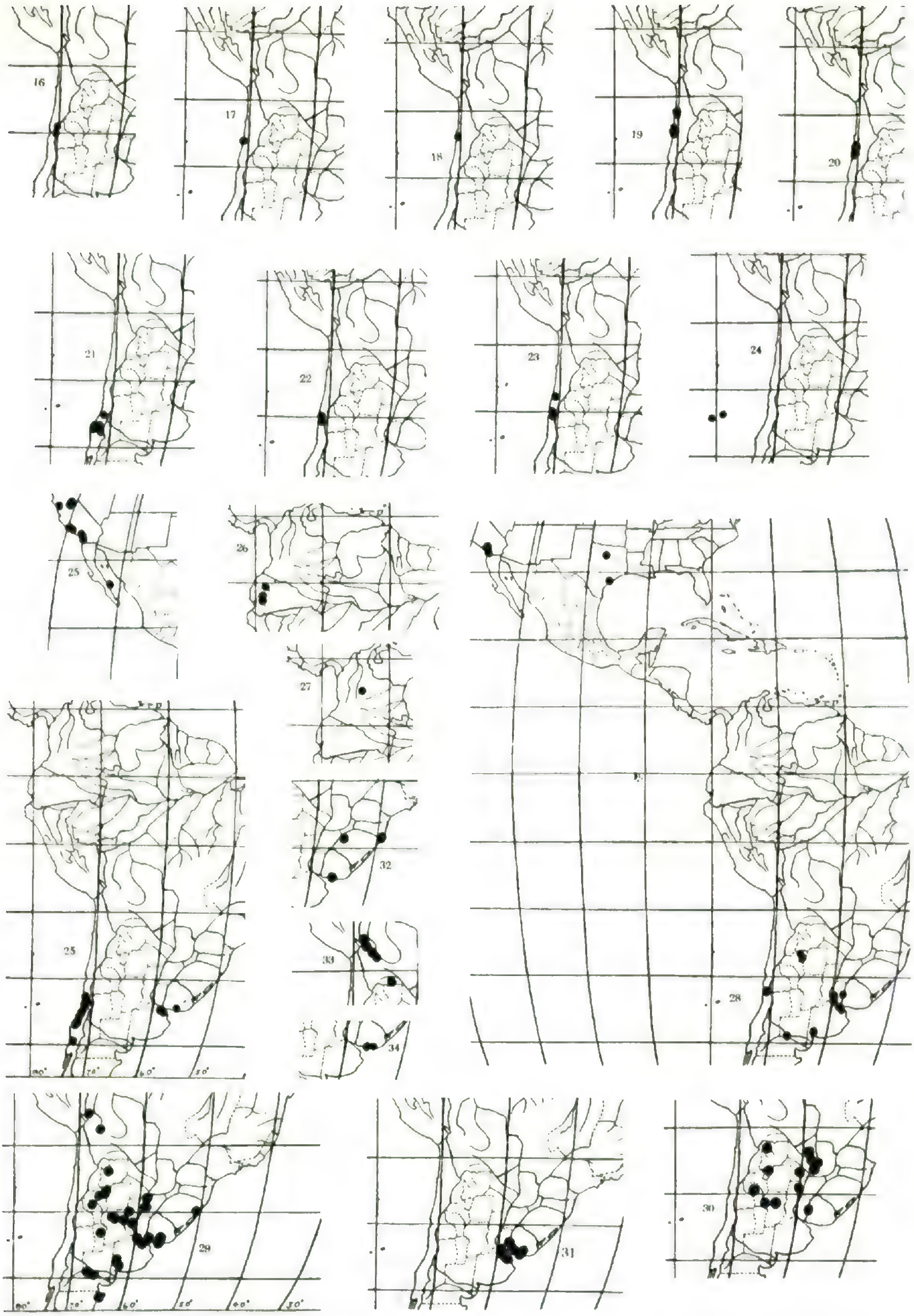
[2] Kindb. Mon. Lepig. 26 (1863), says this collection is in Paris. I have not examined it but assume that it is the same as the Gray specimens.

[3] Mus. Bot. Berol. has a specimen which was marked by Fenzl as *Spergularia grandiflora* Poepp. (1835), and by Kindberg as *Lepigonum grandiflorum*.

cence, *soft with a corky appearance,* 1.5–7 cm. long, 0.4–1.5 mm. in diameter: *leaves* fleshy, mucronate, fascicled, densely glandular-pubescent, 2–7 mm. long, 0.8–1 mm. broad; *stipules* narrowly lanceolate, not attenuate, not erose, white, silvery, 3–5.4 mm. long: *inflorescence only one- or two-flowered: sepals fleshy,* heavily glandular-pubescent, often purple-tinged at the margins, 4–5.4 mm. long; *petals* white, ovate, 3.6–4.5 mm. long, 0.4–1.4 mm. shorter than the calyx; *stamens* 10; *styles* 3, *united about two-thirds of their length,* 1–1.8 mm. long: *mature capsules* 5.4 mm. long, 0.4 mm. longer than the calyx: *fruiting pedicels* filiform, densely glandular-pubescent, 3–5 mm. long, probably reflexed when mature: *seeds dark brown with a silvery tinge, rounded in outline, delicately sculptured in closely interwoven, vermiform pattern, not papillose,*[1] 1 mm. long, *surrounded by a narrow, scarious, entire-margined wing,* 0.1 mm. wide.—Revist. Chil. Nat. xxxiii. 26 (1929). *Arenaria Pissisi* Philippi in Linnaea, xxxiii. 20 (1864). *Tissa Pissisi* (Philippi) Reiche, Fl. Chile, i. 200 (1896).—South America: in the Cordilleras of Chile only in the provinces of Atacama and Coquimbo at about 4000 m. alt. Chile: Prov. Atacama: Dept. Vallenar: on gravelly, sod-covered bank of Laguna Chica, ca. lat. 28° 48′ S., long. 69° 51′ W. (about 3800 m. alt.), *Johnston* 5952, January 6–7, 1926 (G.); about small vegas below pass on west slope of Cerro Negro, in gravel, mats becoming over a meter broad, Quebrada Alfalfa (Q. de los Pozos), ca. lat. 28° 52′ S., long. 69° 49′–54′ W. (ca. 4000 m. alt.), *Johnston* 5985, January 7–8, 1926 (G., U. S.); Cordillera Laguna Chica (alt. ca. 4000 m.), *Werdermann* 255, January, 1924 (G., U. S., U. C.). Prov. Coquimbo: Dept. Elqui: Baños del Toro, *Volkmann* 18 $\frac{60}{61}$ (Santiago, type, photo. in G.); Baños del Toro, *Reed* (K.); Baños del Toro *F. Philippi* 171 (Santiago, photo. in G., agrees with the Kew specimen); 3600 m. alt., Baños del Toro, Valle del Rio Toro, Cordillera de Elqui, *Espinosa,* February 26, 1938 (G., the only collection with mature seeds).

21. S. cremnophila I. M. Johnston (Plate 593, figs. 5a–5e and map 17). Perennial: *root* very heavy, ligneous, as much as 1 cm. thick: *caudex* well developed, bearing many diffuse stems, 13–30 cm. long; *internodes below the inflorescence* heavily glandular-pubescent, 6–15 mm. long, 0.7–1.4 mm. in diameter: *leaves fleshy,* mucronate, glabrous or sparsely glandular-pubescent, fascicled or not, 6–18 mm. long, 1–3 mm. wide: *stipules* broadly lanceolate, variable in length as compared to width, erose at the apex, 1.6–5 mm. long: *inflorescence* a lax leafy cyme; *internodes* densely glandular-pubescent, the lowest 7–20 mm. long, 0.4–1 mm. in diameter; *bracts* foliaceous below, minute above, 1–11 mm. long, glabrous or glandular-pubescent: *sepals* ovate-lanceolate, densely glandular-pubescent, 5–8 mm. long; *petals* white, ovate, 4.4–6 mm. long, equal to the calyx or as much as 2 mm. shorter;

[1] This does not mean that the seeds may never be papillose. The description is based upon the single mature collection known, sent to me by Sr. Marcial R. Espinosa of the Museo Nacional of Santiago, Chile.



Ranges of, 16, Spergularia Pissisi; 17, S. cremnophila; 18, S. aberrans; 19, S. stenocarpa; 20, S. denticulata; 21, S. Cerviana; 22, S. floribunda; 23, S. pycnantha; 24, S. confertiflora; 25, S. villosa (in 2 sections but not showing Oregon station); 26, S. Spruceana; 27, S. colombiana; 28, S. platensis; 29, S. ramosa (three additional stations farther south, in Terr. Santa Cruz); 30, S. ramosa var. diffusa; 31, S. levis (an additional station farther south, in Terr. Santa Cruz); 32, S. grandis; 33, S. pazensis; 34, S. rupestris.

stamens 8–10; *styles* 3, separated to the base or united at most for one-half their length, 0.6–2 mm. long: *mature capsules* 5–6.6 mm. long, equal to the calyx or as much as 2.4 mm. shorter: *fruiting pedicels* filiform, densely glandular-pubescent, spreading but not reflexed, the lowest 8–22 mm. long: *seeds brown, with the surface either dull and sculptured in interwoven, vermiform pattern with occasional small papillae* (as in the type), 0.8–1 mm. long, *or lustrous and smooth with a suggestion of delicate, vermiform tracery,*[1] 0.7–1.2 mm. long, *surrounded by a hard, brown, narrow rim which is often sculptured in vermiform ridges.*—Contrib. Gray Herb. lxxxv. 41 (1929).—South America: grows in coastal Chile in the province of Antofagasta near the Atacama line. Chile: Prov. Antofagasta: Dept. Taltal: crevices at head of high fog-bathed sea-cliff near Aguada Cachina, waterhole in Quebrada Cachina, ca. 6 km. inland from Caleta Esmeralda, ca. lat. 25° 53′ S., *Johnston* 5683, December 15, 1925 (G. type, U. S., F. M., seeds dull, sculptured, papillose, 0.8–1 mm.); prostrate on exposed foggy slopes about summit of Cerro de la Cachina, near Aguada Cachina, *Johnston* 5684, December 15, 1925 (G., U. S., seeds glossy, 1–1.2 mm. long); decumbent on moist, fog-bathed, gravelly slopes at head of Quebrada, above the waterhole, near Aguada Grande ("Cachinal de la Costa" of Philippi), near Antofagasta-Atacama provincial boundary, ca. lat. 26° 2′ S., *Johnston* 5821, December 18, 1925 (G., U. S., F. M., seeds small, lustrous, 0.7–0.8 mm. long, stipules much shorter than in the previous two collections).

These three collections show great variability in type of seed (see citations), length of stipule, type of leaf, and length of sepal in comparison with petals and capsule. The seeds seem too widely different to belong to the same species but no other character can be found to support setting them apart. Glossy-seeded plants have both extremes of stipules and both extremes of leaves and all types of sepals.

Further collections are needed for more accurate understanding, either for support of this treatment or as evidence for some other.

22. S. aberrans I. M. Johnston (Plate 594, figs. 1a–1c and map 18). Perennial: *caudex* bearing many diffuse stems 20–40 cm. long; *internodes of stem below the inflorescence* glandular-pubescent, 10–35 cm. long, 0.6–1.2 mm. in diameter: *leaves* fascicled, mucronate, glabrous, 15–30 mm. long, 0.4–1 mm. wide; *stipules* broadly lance-acuminate, lacerate at the apex, 5–6 mm. long: *inflorescence* a short, open cyme, few-flowered, glandular-pubescent throughout; the *lowest internodes* 12–30 mm. long, 3–4 mm. in diameter; *bracts* 2–6 mm. long, glandular-pubescent: *sepals* linear, acute-tipped, glandular-pubescent, 4.8–5.6 mm. long; *petals* ovate, white, nearly equal to the

[1] This looks as though a seed like those of the type but without papillae had been heavily varnished, leaving only the slightest suggestion of what might have been deep sculpture!

calyx, 4.6–5.4 mm. long; *stamens* 5; *styles* 3, united when young, dividing to at least half their length as flower matures, 1–1.8 mm. long: *mature capsules* 4–5.4 mm. long, equal to or slightly exceeded by the calyx: *fruiting pedicels* not reflexed, filiform, 10–15 mm. long: *seeds dark, sepia-brown, rounded in outline, surface sculptured in interwoven, areolar, vermiform pattern, covered with dark brown papillae,* 0.8–0.9 mm. long, *surrounded by a narrow, dark brown wing, which is also sculptured in vermiform pattern next to the seed,* at most 0.1 mm. wide.—Contrib. Gray Herb. lxxxv. 147 (1929).—South America: only in the northern part of Chile in the province of Antofagasta. Chile: Prov. Antofagasta: Dept. Antofagasta: in rock crevices, base of hills just southeast of La Chimba, Antofagasta, *Johnston* 3631, October 19, 1925 (G., type); Antofagasta, *Jaffuel* 1136, October 29, 1930 (G.). Dept. Tocopilla: Tocopilla, *Jaffuel* 1007, October 27, 1930 (G.), probably, but no fruit or flowers.

S. aberrans was so named because of its "reduced androecium and united styles." This condition was considered by Dr. Johnston as atypical of the genus. However, five stamens are to be found in many species, such as *S. marina, S. canadensis, S. denticulata, S. stenocarpa, S. floribunda* and *S. platensis;* and united styles may occur in the following species: *S. fasciculata, S. Pissisi, S. cremnophila, S. stenocarpa, S. rupestris,* and *S. depauperata.*

23. S. stenocarpa (Philippi) I. M. Johnston (Plate 594, figs. 2a–2d and map 19). Annual or perennial: *caudex* bearing 3–∞ diffuse stems, 9–35 cm. long, usually many, which in turn may branch several times; *internodes of stem below the inflorescence* 8–40 mm., usually 20–30 mm. long, 0.5–1.2 mm. in diameter, nearly glabrous or usually covered with short glandular pubescence: *leaves* glabrous, *fascicled*, mucronate, 11–40 mm., usually 15–30 mm. long, 0.8–1.4 mm. wide; *stipules* broadly lanceolate, acuminate, slightly lacerate at the tip, 2.5–5 mm., usually 3–4 mm. long: *inflorescence an open, leafy, compound cyme; internodes* shortly glandular-pubescent, the *lowest* 8–30 mm., usually 13–25 mm. long, 0.3–0.8 mm. in diameter; *bracts* foliaceous below, minute above: *sepals linear-attenuate, the outer occasionally mucronate,* glabrous, 3–4.6 mm. long; *petals* white, ovate, 2.8–3.2 mm. long; *stamens* 5; *styles* 3, united when young, separating at least half their length or nearly to the base as flower matures, 0.8–1 mm. long: *mature capsules* 3.2–4.8 mm. long, *equal to or exceeding the calyx* by as much as 0.2–0.8 mm.: *fruiting pedicels* not reflexed, filiform, glandular-pubescent, the lowest 6–12 mm., usually 9–11 mm. long: *seeds brown, lustrous, smooth or slightly roughened with a suggestion of sculpture in vermiform pattern,* 0.4–0.7 mm. long, *not winged but sometimes with a very narrow, brown rim.*—Contrib. Gray Herb. lxxxv. 41 (1929). *Arenaria stenocarpa* Philippi, Fl. Atac. 10 (1860) and Viage Des. Atac. 19, 184 (1860). *S. Larrañagae* Philippi in Anal. Univ.

Chile, lxxxi. 767 (1892). *S. Borchersi* Philippi in Anal. Univ. Chile, lxxxi. 769 (1892). *Tissa Borchersi* (Philippi) Reiche, Fl. Chile, 199 (1896).—South America: known only on the coast of Chile in the province of Antofagasta. Chile: Prov. Antofagasta: Dept. Tocopilla: Tocopilla, *Jaffuel* 1017, October 27, 1930 (G., seeds large but plant in poor condition); Cobija, *Gaudichaud*, July, 1836 (G., seeds large, only scraps of a plant). Dept. Taltal: prostrate on gravelly slope near Perales, vicinity of Paposo, Quebrada de Guanillo, *Johnston* 5604, December 8, 1925 (G., seeds large, spec. marked "the large plant has the calyx and flower-size of the type of *S. Larrañagae* Ph!" by Johnston); decumbent on rocky seaward slope between Quebrada San Ramon and Poso Malo, *Johnston* 5177, November 28, 1925 (G.); prostrate annual on gravelly bench just back of beach, petals white, Caleta de Hueso Parado, vicinity of Taltal, *Johnston* 5162, November 26, 1925 (G., U. S., outermost sepals mucronate but capsule and habit typical); Hueso Parado, *Philippi* (Santiago, type, photo. and fragment in G.); Taltal, about 50 m. alt., *Werdermann* 799, October, 1925 (G., U. S., B., F. M., Cal. Acad., U. C., outermost sepals mucronate but habit typical); dry hillside about 8 km. south of town in Quebrada de Infieles, vicinity of Taltal, *Johnston* 5641, December 13, 1925 (G., U. S., plant small, more compact than any of the preceding); Quebrada de Taltal, *Montero* 2897, September 10, 1936 (G.); Puerto Oliva near Taltal, *Borchers* 2286, 1887 (Santiago, photo. and fragment in G., type of *Spergularia Borchersi* Philippi); Breas, *Larrañaga*, 1888 (Santiago, photo. and fragment in G., type of *Spergularia Larrañagae* Philippi, identification not absolutely positive).

There is a great seed variation, as will be noticed in the figure and citations. It is possible that, with many more collections, the larger-seeded plants might be found to have a more northerly range and enough constant characters to set them apart taxonomically. At present it seems best to include them all in *S. stenocarpa.*

The type of *Spergularia Larrañagae* Philippi is immature but, since its sepals are only very slightly mucronate, it is here included, although with more collecting plants like it may possibly be found to belong to *S. denticulata.* The fact that it was collected between the general ranges of the two species is significant. Its immaturity prevents any sure classification.

24. S. denticulata Philippi (Plate 594, figs. 3a–3c and map 20). Annual: *caudex* bearing 5–∞ diffuse, branching stems 4–17 cm. long: *internodes of stem below the inflorescence* few in number, covered with short, glandular pubescence, 5–24 mm., usually 10–20 mm. long, 0.4–1 mm. in diameter: *leaves* glabrous, mucronate, *usually not fascicled,* 8–20 mm. long, 0.8–1.4 mm. wide; *stipules* broadly lanceolate, 2.2–3.8 mm. long, only slightly lacerate at the tip: *inflorescence a crowded*

compound cyme; internodes covered with short, glandular pubescence, the lowest 5–18 mm. long, 0.3–0.9 mm. in diameter; *bracts* foliaceous, 3–12 mm. long: *sepals linear*, glabrous, *usually with attenuate, scarious or setaceous apices, sometimes blunt in the inner sepals*, 4–4.8 mm. long; *petals* white, ovate, 2.6–3.2 mm. long; *stamens* 5; *styles* 3, separated to the base, 0.6–0.8 mm. long: *mature capsules* 3–4 mm. long, *exceeded by the calyx* by as much as 0.4–1.6 mm., usually 0.8–1.2 mm.: *fruiting pedicels* not reflexed, sparsely glandular-pubescent, filiform, 2–9 mm. long: *seeds brown, dull with a smooth or slightly hubbled surface*, 0.5–0.6 mm. long, *not winged but often surrounded by a very narrow, brown rim*. —Anal. Univ. Chile, lxxxi. 769 (1892). *Arenaria denticulata* Philippi, Fl. Atac. 10 (1860). *Tissa denticulata* (Philippi) Reiche, Fl. Chile, i. 199 (1896).—SOUTH AMERICA: only on coast of Chile in the provinces of Antofagasta and Atacama. CHILE: PROV. ANTOFAGASTA: Dept. Taltal: one plant on dry rocky slope just north of summit of Porto Mina Carola, Sierra Esmeralda, along trail between Posado Hidalgos and Quebrada Cachina via Portezuelo de Mina Carola, *Johnston* 5672, December 14, 1925 (G.); common on gravelly or sandy soil, region about Aguado Cachina (waterhole in Quebrada Cachina ca. 6 km. inland from Caleta Esmeralda), *Johnston* 5737, December 14–15, 1925 (G., U. S., F. M.); dry sandy floor of quebrada about water-hole, vicinity of Aguada Grande ("Cachinal de la Costa" of Philippi), near Antofagasta-Atacama provincial boundary, *Johnston* 5822, December 16–18, 1925 (G.); Cachinal de la Costa, *Philippi*, December, 1853 (Santiago, TYPE, photo. and fragment in G.). PROV. ATACAMA: Dept. Chañaral: on dry sandy slope ca. 1.5 km. above the caleta, vicinity of Caleta Pan de Azucar, *Johnston* 5833, December 18, 1925 (G.); sandy plain near sea, prostrate herb with white flowers, not common, vicinity of Puerto de Chañaral, hills back of El Barquito, *Johnston* 4754, October 28–29, 1925 (G., U. S.).

This species is similar to *S. stenocarpa* in leaves and stipules and in the repeatedly branching stems. Both have compound cymes and five stamens. The seeds of both species are of the same size and shape and in both have narrow, brown rims. The two species, however, differ in many ways. *S. denticulata* has usually shorter stems with shorter internodes, a compact instead of a loose cyme, capsule shorter than calyx instead of equalling or longer than the calyx, and shorter styles divided completely to the base. *S. denticulata* always has dull seeds; *S. stenocarpa* always has lustrous ones. Although *S. denticulata* nearly always has strongly mucronate sepals, occasionally the inner are blunt at the apex. Likewise *S. stenocarpa*, although it usually has blunt sepals, occasionally has the outer mucronate. Many more collections of these two species are needed, and perhaps cytological work as well, in order to understand thoroughly the significance of those plants with both types of sepals.

25. S. Cerviana (Cham. & Schlecht.) G. Don (Plate 594, figs. 4a–4d and map 21). Perennial: stems at least 14–17 cm. tall;[1] *internodes of stem below the inflorescence* 5–23 cm. long, 0.7–1.2 mm. in diameter: *leaves* fascicled, shortly mucronate, filiform, glabrous or shortly and sparsely pubescent, 13–35 mm. long, 0.6–0.8 mm. broad; *stipules* broadly lanceolate-acuminate, 2–6 mm. long: *inflorescence* a compound cyme, glabrous throughout or only shortly and sparsely pubescent, *usually crowded because of the many capsules and short internodes; internodes* slender, the lowest 1–21 mm. long, 0.4–0.6 mm. in diameter; *bracts* foliaceous, lacking or as much as 15 mm. long: *sepals* linear, *blunt-tipped, glabrous,* 2.6–4.5 mm. long; *petals* white, ovate, 2–4 mm. long, equal to or as much as 0.5 mm. shorter than the sepals; *stamens* 10; *styles* 3, separated to the base, 0.6–0.8 mm. long: *mature capsules* 3.2–4.2 mm. long, equal to or as much as 0.4 mm. shorter than or 0.8 mm. longer than the calyx; *fruiting pedicels* filiform, *not reflexed, glabrous,* the lowest 4–12 mm. long, 0.2 mm. in diameter: *seeds* 0.6–0.8 *mm. long, dark brown, pyriform, silvery, deeply sculptured in closely interwoven, vermiform pattern, covered with large, light brown, glandular papillae, sometimes dark brown and more rigid on the flat sides of the seed,* not winged.—Gen. Hist. Dichl. Pl. i. 426 (1831). *Arenaria Cerviana* Cham. & Schlecht. in Linnaea, i. 52 (1826). *Spergula Cerviana* (Cham. & Schlecht.) D. Dietr. Syn. Pl. ii. 1598 (1840). *Lepigonum purpureum* var. *firmum* Kindb. Mon. Lepig. 33, t. 3, fig. 21 (1863). *Spergularia firma* (Kindb.) Rohrb. in Linnaea, xxxvii. 231 (1871–73). *Spergularia polyantha* Philippi in Anal. Univ. Chile, lxxxi. (Pl. Nuev. Chil.) 765 (1892).—South America: grows only in south-central Chile. Chile: Prov. Curico: Dept. ?: ca. 1500 m. Hacienda Monte Grande, *Werdermann* 1671, December, 1924 (B., seeds immature). Prov. Nuble: Dept. Chillan: *Narcissus Briones,* 1887 (Santiago, photo. and fragment in G., type of *Arenaria polyantha* Philippi). Dept. Laja: in stony fields at Antuco, *Pöppig* 125, December (B., type of *Lepigonum purpureum* var. *firmum* Kindberg and marked by him in 1861); also *Pöppig* 804 (same collection, I think, Geneva, photo. in F. M.). Prov. Concepcion: Dept. Talcaguano: [Talcaguano, Feb. 13–Mar. 8, 1816],[2] *Chamisso* (B. type, marked *Arenaria Cerviana* N.). Dept. Lautaro: Coronel, *A. W. Hill* 42, December, 1902 (K., seeds immature).

There is great variation in comparative lengths of capsule and calyx, as is shown in the illustration. However, there are too few collections known for an understanding of the significance of this variation. At present it seems best to include all these plants under one species, especially since all fruiting plants have similar seeds.

26. S. floribunda (Gay) Rohrb. (Plate 594, figs. 5a–5e and map 22). Perennial with a heavy ligneous root as much as 5 mm. thick:

[1] Most of the collections are rootless.

[2] Locality and date found in Linnaea, i. 10 (1826).

caudex well developed, nodose, bearing 8–∞ diffuse stems 3–13 cm. long: *internodes of stem below the inflorescence* glandular-pubescent, 2.5–20 mm. long, 0.3–0.8 mm. in diameter: *leaves* filiform, mucronate, glabrous or glandular-pubescent, usually not fascicled or if so with only 1 leaf in the axil, 4–20 mm. long, 0.4–0.8 mm. broad; *stipules* broadly lanceolate, acuminate, 2–3.8 mm. long; *inflorescence a crowded cyme; internodes* usually too crowded to measure or 1–5 mm. long; *bracts* foliaceous, minute, 2–5 mm. long: *sepals* linear, with broad, scarious margins, sparsely glandular-pubescent especially toward the base, 2.8–5 mm. long; *petals* white, ovate, 2.4–3.8 mm. long, as much as 1.2–2 mm. shorter than the calyx; *stamens* 3–5; *styles* 3, divided to the base, 0.7–1 mm. long: *mature capsules spherical*, 2.4–3.8 mm. long, equal to or as much as 0.4–1.2 mm. shorter than the calyx: *fruiting pedicels* filiform, glandular-pubescent, 1.2–2 mm. long: *seeds* 0.4–0.7 *mm. long, black, pyriform, the surface sculptured in vermiform, areolar pattern and densely covered with short, coarse (sometimes partially rigid) brownish or blackish, glandular papillae,* not winged.—Linnaea, xxxvii. 230 (1871–73). *Arenaria floribunda* Gay,[1] Fl. Chile, i. 269 (1845). *Lepigonum floribundum* (Gay) Kindb. Synop. Lepig. 5 (1856). *L. depauperatum *floribundum* (Gay) Kindb. Mon. Lepig. 26 (1863). *S. coquimbensis* Philippi in Anal. Univ. Chile, lxxxi. 763 (1893). *Tissa floribunda* (Gay) Reiche, Fl. Chile, i. 197 (1896).—South America: known only in coastal Chile in the province of Coquimbo. Chile: Prov. Coquimbo: Dept. La Serena: vicinity of La Serena, *Cl. Gay* (G., K., type collection);[2] Punta de Teatinos, La Serena, *Werdermann* 1542, November, 1925 (B.), in part only; Cerro Penascudo, *Barros* 255, September 13, 1928 (G.). Dept. Coquimbo: vicinity of Coquimbo, *Jaffuel* 2671, September, 1931 (G.); Coquimbo, *Jaffuel* 1289, November 3, 1930 (G.); Coquimbo, *Reed* (K.); "El Faro," Coquimbo, *Montero* 2833, September 16, 1936 (G.); Coquimbo, *Philippi* 1951, September, 1885 (Santiago, photo. and fragment in G., type of *S. coquimbensis* Philippi). Dept. Ovalle: Steppe bei Cerillos west Ovalle, *Otto Berninger* 638, September 19, 1925 (B.).

S. floribunda is quickly recognized by its crowded cyme, spherical capsules and small, black, densely papillose seeds. The type of *S. coquimbensis* Philippi is an exact match for specimens of the type collection of *Arenaria floribunda* Gay.

27. S. **pycnantha,** spec. nov. (tab. 594, fig. 6a–6e). Perennis: caudice ramoso, caulibus 2–6 diffusis interdum divisis, 6–20 cm.

[1] Gay must here be considered the author, instead of Naudin as is usually thought, because, as previously stated, there is no author cited at the end of "Cariophylleas," as there is after the "Elatineas," and no later publication that I have been able to find states that Naudin did the work on the *Caryophyllaceae*. This is decided also in spite of the fact that Gay credited Naudin with the authorship on the labels of the type collections.

[2] Type not seen but is supposedly in the Muséum National d'Histoire Naturelle at Paris.

longis; internodiis caulis partis efloriferae dense villoso-glandulosis, 6–25 mm. longis, 0.4–1.4 mm. crassis: foliis glabris vel villoso-glandulosis, breviter mucronatis, fasciculatis, 7–30 mm. longis, 0.6–1.4 mm. latis: stipulis conspicuis, lanceolatis acuminatis, apice laceratis, 5–7 mm. longis: cyma composita, villoso-glandulosa, propter internodium longum infra flores infimos alte supra reliquas partes plantae producta; internodiis infimis 1–15 mm. longis, 0.2–0.6 mm. crassis; bracteis foliosis 1.2–10 mm. longis: sepalis linearibus, margine late scariosis, villoso-glandulosis, 3.6–4.6 mm. longis; petalis albis, ovatis, 2.4–3 mm. longis, sepalis 0.6–1.6 mm. brevioribus; staminibus 2–5; stylis 3, 0.6–0.8 mm. longis: capsulis maturis 3.2–4.2 mm. longis, sepalis aequantibus vel eis 0.8 mm. brevioribus: pedicellis fructiferis filiformibus, villoso-glandulosis, haud reflexis, 2–7 mm. longis: seminibus 0.3–0.5 mm. longis, ferrugineis, lineis vermiformibus intertextis sculptis, fere laevibus vel tumulis prominentibus productis areolis, aliquando papillis parvis ferrugineis, haud alatis.—South America: coastal Chile, only in the provinces of Atacama and Coquimbo. Chile: Prov. Atacama: Dept. Copaipó: Bandurrias, *Giesse* (B.); Desert of Atacama, *Giesse* 132, 1885–87 (N. Y., one plant only on the sheet, identical with the Bandurrias specimen); Vallenar, *Barros* 263, September 9, 1927 (G., not mature). Dept. Freirina: Huasco, *Jaffuel* 1164, November 2, 1930 (G., type). Prov. Coquimbo: Dept. La Serena: La Serena, *Claude-Joseph* 4461, October, 1926 (U. S.). Dept. Coquimbo: Guayacan, *Philippi*, November, 1864 (B.); Coquimbo, *Montero* 1850, September 26, 1934 (G.); Coquimbo, *Rose* 19316, October 11, 1914 (U. S., only part of sheet). Dept. Ovalle: Ovalle, *Claude-Joseph* 5197 & 5198, October, 1927 (U. S.). Dept. ?: Agosto, *Jaffuel* 3927, 1937 (G.). Map 23.

28. S. confertiflora Steud. (Plate 594, figs. 8a–8c and map 24). Perennial with heavy root as much as 4 mm. in diameter; *caudex* elongate, bearing one to several *prostrate*, much branched stems 10–25 cm. long; *internodes below the inflorescence* glabrous or glandular-pubescent, 2–20 mm. long, 0.5–1.6 mm. in diameter; *leaves filiform, densely fascicled*, or with a small branch in the axil, shortly mucronate or abruptly acute, glabrous or sparsely glandular-pubescent, 7–30 mm. long, 0.3–0.7 mm. wide; *stipules* lanceolate-acuminate, 3.2–6 mm. long: *inflorescence* a loose, many-flowered cyme; *internodes* filiform, glandular-pubescent, the lowest 2–16 mm. long, 0.2–0.5 mm. in diameter; *bracts* small, becoming minute above, glandular-pubescent, 1–7 mm. long: *sepals* linear, glandular-pubescent, 4.8–6.2 mm. long; *petals* white, ovate, 3–5.6 mm. long, as much as 1.2–2.6 mm. shorter than the calyx; *stamens* 7–10; *styles* 3, separated to the base, 0.4–0.6 mm. long: *mature capsules slender,* 4–6 mm. long, equal to or as much as 0.8 mm. shorter than the calyx: *fruiting pedicels* erect, filiform, glandular-pubescent, the lowest 3–7 mm. long: *seeds* 0.6–0.7 mm. long, *brown, rounded in outline, obscurely sculptured in interwoven, vermiform pattern, covered with papillae which may be round or elongate and slightly curved,*[1] not

[1] Some seeds may have both kinds of papillae, others have entirely elongate ones.

winged.—Flora, 425 (1856); Philippi in Anal. Univ. Chile, lxxxi. (Pl. Nuevas Chile) 768 (1892); Skottsberg, Nat. Hist. Juan Fernandez and Easter Is. ii. (Phan. Juan Fernandez) 121 (1922). *Arenaria rubra* sensu Hooker & Arnott in Hooker's Bot. Misc. iii. 147 (1832), in part, including Juan Fernandez (spec. *Bertero*), excluding Valparaiso (*Bridges*), which is *S. villosa*,[1] non L. (1753). *Arenaria rubra* var. *polyphylla* Philippi in Bot. Zeitung, xiv. 642 (1856) (at least in part because of an annotated *Philippi* collection (K.) from Juan Fernandez but probably not as to Rancagua plants[2]). *S. campestris* 2. forma multicaulis stricta, etc. Rohrb. in Linnaea, xxxvii. 230 (1871–1873). *S. polyphylla* (Philippi) Rohrb. l. c. 232 (1871–73). *S. confertiflora* var. *polyphylla* (Philippi) Skottsberg, Nat. Hist. Juan Fernandez and Easter Is. ii. (Phan. Juan Fernandez) 121 (1922). *Tissa polyphylla* (Philippi) Reiche, Fl. Chile i. 197 (1896). *S. rubra* sensu Johow, Estud. Fl. Juan Fernandez, 118 (1896), non *Arenaria rubra* L. (1753). —SOUTH AMERICA: only on the Juan Fernandez Islands. CHILE: Juan Fernandez Islands: on sea cliffs, *Bertero* 1431, March, 1830 (K., TYPE COLLECTION);[3] Juan Fernandez, *Philippi*, 1861 (K., marked *polyphylla* in same manner as other Philippi labels, type collection of *Arenaria rubra* var. *polyphylla* Philippi?); Juan Fernandez, *Moseley* (Challenger Exped.), November, 1875 (K.); Juan Fernandez, *Hooker f.* (N. Y.); Masatierra, Punta San Carlos, *C. & I. Skottsberg* 123, January 9, 1917 (N. Y., marked *Spergularia confertiflora* Steud. by Skottsberg); Masatierra, Bahia de Padre, *C. & I. Skottsberg* 296 (U. S.).

This species is apparently endemic in the Juan Fernandez Islands. Many more collections are needed thoroughly to understand its variations and to determine whether there is any foundation for the reports of its occurrence on the mainland of Chile.

29. S. VILLOSA (Pers.) Camb. (PLATE 594, FIGS. 7a–7d and MAP 25). *Perennial* with a heavy ligneous central root; *caudex* well developed, branched, bearing 2–many, usually many, diffuse stems 9–30 cm. long; *internodes of stem below the inflorescence* usually glandular-pubescent, sometimes glabrous below, but always pubescent above, 3–40 mm. long, 0.4–1.7 mm. wide; *leaves* fascicled, filiform, mucronate, 10–40 mm. long, 0.3–1.2 mm. broad, usually glandular-pubescent; *stipules* broadly lanceolate, acuminate, occasionally, when small, deltoid, 2–8 mm. long; *inflorescence* a lax, many-flowered cyme, always glandular-pubescent, the *lowest internodes* 5–35 mm. long, 0.2–0.8 mm. in diameter; *bracts* usually minute, 1–7 mm. long, occasionally foliaceous, 8–15 mm. long; *sepals* linear-lanceolate, glandular-pubescent, 2.8–5.2 mm. long; *petals* white, ovate, 2.6–5 mm. long, usually 0.6–1.6 mm. shorter than the calyx; *stamens* 7–10; *styles* 3, separated to the base,

[1] The remaining collections cited were not seen by the author.

[2] Rancagua is on the mainland of Chile, whence the author has seen no collections of this species.

[3] Is the type at Paris? Flora, 402 (1856) note!

0.4–0.6 mm. long: *mature capsules* 4–6.5 mm., usually 5–6 mm. long, and 0.3–1.8 mm., usually 0.8–1.8 mm. *longer than calyx: fruiting pedicels* filiform, always glandular-pubescent, usually reflexed, though sometimes erect, the lowest 5–18 mm. long: *seeds* 0.4–0.65 mm., usually 0.5–0.6 mm. long, *dark brown, almost black, pyriform, with small black papillae in regular pattern or smooth, occasionally with small raised places in the same pattern as the papillae, covered with very delicate, vermiform traceries in areolar pattern,* with or without a scarious, white, *erose wing* 0.1–0.2 mm. wide, often with a brown zone next to the seed.—In St. Hilaire, Fl. Bras. ii. 178 (1829); Arech. in Anal. Mus. Nac. Montevideo, iii. (Fl. Uruguay) i. 93 (1901) in part (including references to *Spergula villosa* Pers. and *Lepigonum trachyspermum* Kindb. and localities given, excluding the description and reference to *S. villosa α. genuina* Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 268, t. lxi, fig. 1 (1872), which apply to *S. ramosa* and *S. rupestris, q. v.*); Buchtien, Contrib. Fl. Bolivia, pt. i. iii. (1910) (as to source of name but not as to plant cited, La Paz 448, which is *S. pazensis*); Macbride, Field Mus. Pub. Bot. xiii. (Fl. Peru) pt. ii. no. 2, 633 (1937) (as to source of name but not as to plants described, because of "seeds yellow," and excluding reference, Mart. Fl. Bras. xiv. pt. 2, pl. 61, both of which probably apply to *S. ramosa, q. v.*). *Spergula villosa* Pers. Synop. i. 522 (1805); Steud. Nom. Bot. ed. 2, ii. 617 (1841). *Arenaria media* sensu Hooker & Arnott in Hooker, Bot. Misc. iii. 147 (1832), in part (including the collections from Valparaiso of *Cruickshanks* and *Cuming* 550, excluding collections Buenos Aires (*Gillies*) and Valparaiso (*Bridges*) both of which are *S. media*), non L. (1762); sensu Gay, Fl. Chile i. 267 (1845) (because a specimen collected by *Gay* in Chile is labeled *A. media* by him and is actually *S. villosa*), non L. (1762). *Lepigonum villosum* Fisch. & Mey. Ind. Sem. Hort. Petrop. iv. 15 (1837), *nomen nudum. L. villosum* (Pers.) Kindb. Synop. Lepig. 16 (1856). *L. glandulosum* Liebm. Ind. Sem. H. Haun. 21 (1853), not Kindb. Mon. Lepig. 16 (1863) (which is based upon an entirely different African plant, *Arenaria glandulosa* Jacquin, Hort. Schoenb. iii. 56, pl. 355 (1798). *Arenaria Berteroana* Philippi in Linnaea, xxviii. 673 (1856). *Spergularia remotiflora* Steud. in Flora, 425 (1856), probably synonymous, according to description (the collection cited, *Bertero* 811, was not seen by me); Philippi in Anal. Univ. Chile, lxxxi. 768 (1892). *S. rupestris* sensu Steud. in Flora, 424 (1856) (because the cited specimens, *Bertero* 810 & 58, are *S. villosa*) non Camb. (1829); sensu Philippi in Anal. Univ. Chile, lxxxi. 771 (1892), for same reasons as above, non Camb. (1829). *Lepigonum Liebmannianum* Lange, Ind. Sem. H. Haun. 2 (1859); Kindb. Mon. Lepig. 27 (1863). *L. arenarium* Kindb. Synop. Lepig. 13 (1856) (because he cites *Arenaria media* Gay and the Coquimbo, *Gay*, collection which is probably *S. villosa*—see citations); Kindb. Mon. Lepig. 17, t. i, fig. 3 (1863); including the references, *S. villosa* Camb. and *A. media* Gay, and the collections, Coquimbo, Chile, *Gay*, probably, and

Talcahuano, *Pöppig*, and the left-hand plant and the seed with the erose-margined wing; and excluding the references, *S. grandis* Camb., *S. ramosa* Camb., *A. grandis* HBK. & DC., and the remainder of the figure and specimens cited, all of which apply to *S. grandis* and *S. ramosa, q. v.*). *L. arenarium* Kindb. var. *depressa* Kindb. Mon. Lepig. 17, t. i, fig. 4 (1863). *L. macrorhizum* (Réq.) Kindb. var. "seminibus alatis floribus paulo minoribus," Kindb. Mon. Lepig. 22 (1863) (because coll. by *Pöppig*, Chile ad Concon, is *S. villosa*). *L. trachyspermum* Kindb. Mon. Lepig. 31, t. ii, fig. 16 (1863), in part (including the references, *S. villosa* Camb. and *Spergula villosa* Pers., and the collection, *Bertero*, Chile (B.) (cf. under citations); and excluding the citations, Montevideo, *Sello* and Maldonado, *Camb. & St. Hil.*, which are *S. ramosa* and *S. rupestris*, and the fig. 16, which is *S. ramosa*). *Spergularia campestris* sensu Rohrb. in Mart. Fl. Bras. xiv. pt. ii, 267 (1872), in part (including, probably, citation, Montevideo, *Sello*,[1] and the reference, *S. remotiflora* Steud.; excluding European plants which are probably *S. rubra*), non *Arenaria rubra* var. *campestris* L. (1753); sensu Rohrb. in Linnaea, xxxvii. 229 (1871–73), probably in part (including "Forma diffusior inflorescentia laxiore pauciflora," etc. and reference, *S. remotiflora* Steud., though neither collection cited has been seen by the author; excluding "Forma multicaulis . . ."), non *Arenaria rubra* var. *campestris* L. (1753). *Spergularia marina* sensu Rohrb. in Mart. Fl. Bras. xiv. pt. ii, 273 (1872), in small part (including only at least one of the Montevideo, *Sello*, specimens (see citations) and the reference *Lepigonum rupestre* Kindb. only as to the *Sello* plants), non *Arenaria rubra* var. *marina* L. (1753). *S. villosa* α. *genuina* Rohrb. in Mart. Fl. Bras. xiv. pt. ii, 269 (1872), in part (including the references, *Spergula villosa* Pers., *Spergularia villosa* (Pers.) Camb., and *Lepigonum trachyspermum* Kindb. in part; and excluding *Lepigonum murale* Kindb. and the entire figure, which are *S. ramosa* and *S. rupestris, q. v.*); Rohrb. in Linnaea, xxxvii. 238 (1871–73), in part, for the same reasons as above. *S. villosa* var. β. *Berteroana* (Philippi) Rohrb. in Mart. Fl. Bras. xiv. pt. ii, 269 (1872);[2] Rohrb. in Linnaea, xxxvii. 239 (1871–73); Arech. in Anal. Mus. Nac. Montevideo, iii. (Fl. Uruguay i.) 94 (1901). *S. media* 2. "Forma capsula calycem aequante vel vix superante," Rohrb. in Mart. Fl. Bras. xiv. pt. ii, 271 (1872), in part (including the synonyms, *A. media* Gay and *L. arenarium* Kindb., and excluding the synonyms, *S. ramosa* Camb. and *Spergula racemosa* Dietr., which belong with *S. ramosa*); Rohrb. in Linnaea, xxxvii. 243 (1871–73), at least in part, for the same reasons as above. *S. Liebmanniana* (Lange) Rohrb. in Linnaea, xxxvii. 242 (1871–73). *S. media*, 3. "Forma dense caespitosa humilis capsula calyce breviore," Rohrb. in Linnaea, xxxvii. 243 (1871–73).[3] *Tissa villosa* (Pers.) Britt. in Bull. Torr. Bot. Club, xvi.

[1] Although no specimens were found by the author annotated in this manner by Rohrbach.

[2] The collection, "prope Vicuña, *Cl. Gay*," however, was not seen by the author.

[3] This form cannot possibly have any relationship with *Spergularia media* (L.) Griseb. under which he puts it.

62 (1889), as to source of name but not as to plants cited which are *S. pazensis, q. v.;* Britt. l. c. 129 (1889), excluding the Andean plants which are probably *S. pazensis.* *T. Clevelandi* Greene, Fl. Francisc. 127 (1891); Jepson, Fl. W. Mid. Calif. 170 (1901); Greene, Man. Bot. San Francisc. Bay, 36 (1894). *T. grandis* sensu Morong & Britt., in Ann. N. Y. Acad. Sci. vii. (Enum. of Pl. coll. by Morong in Paraguay) 53 (1892), in part (including citation, Buenos Aires, *Morong* 3, but excluding *Morong* 921 which is *Spergularia ramosa* var. *diffusa*), non *Spergula grandis* Pers. (1805). *Spergularia aprica* Philippi in Anal. Univ. Chile, lxxxii. 766 (1893). *Tissa rubra* sensu K. Brandegee in Zoe, iv. 84 (1893), non *Arenaria rubra* L. (1753). *S. Clevelandi* (Greene) Robins. in Proc. Am. Acad. xxix. 310 (1894) and in Gray, Synop. Fl. i. pt. i. 251 (1897); Jepson, Fl. Calif. pt. v. 494 (1914) and Man. Fl. Pl. Calif. 360 (1923); Munz, Man. So. Calif. Bot. 163 (1935). *Tissa glandulosa* (Liebm.) Reiche, Fl. Chile, i. 196 (1896). *T. media* var. *Berteroana* (Philippi) Reiche, l. c. 201 (1896). *Buda campestris* sensu Kuntze, Rev. Gen. iii. pt. ii, 13 (1898), in part at least (including citation, Chile, *Maule*)[1] non *Arenaria rubra* var. *campestris* L. (1753). *Spergularia rubra* sensu Arech. in Anal. Mus. Nac. Montevideo, iii. (Fl. Uruguay, i.) 91 (1901), non *Arenaria rubra* L. (1753). *Tissa argillosa* Greene ex C. F. Baker, West. Am. Plants, ii. 18 (1903), *nomen solum.* *Alsine Clevelandi* (Greene) House in Am. Midl. Nat. vii. 134 (1921).—South America, and introduced in North America: common in southern Chile and probably introduced in Uruguay around Montevideo and in the Argentine at Buenos Aires and La Plata, and also introduced in California about cities from San Diego north to San Francisco, and near Portland, Oregon. Chile: Prov. Coquimbo: Dept. La Serena: Punta de Teatinas (alt. ca. 10 m.), *Werdermann* 1542, October, 1925 (B.). Prov. Aconcagua: in stony pastures on hills and on river banks, Quillota, *Bertero* 810, October–November, 1829 (N. Y.,[2] F. M., Leiden, immature); on road-sides, Valparaiso, *Buchtien*, December 8, 1895 (U. S., G.); Valparaiso, *Meyen*, 1831 (B., 2 sheets, one marked by Kindb. 1861,[3] but with a combination which he never published); Valparaiso, *Claude-Joseph* 3619, October, 1925 (U. S.); Valparaiso, *Wilkes Exped.* (G., U. S., no seeds and puny specimens but probably *S. villosa*); Valparaiso, *Bridges*, 1830 (K., seeds unusually small, 0.45 mm. long); near Valparaiso, *Cuming* 550, 1831 (K.);[4] Quebrada las Zarras que domina Valparaiso, *Jaffuel* 637, November, 1910 (G.); Valle de Marga-Marga, 40 km. east of Valparaiso, *Jaffuel* 639, October, 1910 (G., immature); Quintero (La Ventana), *Marta H. Looser* 3374, February, 1936 (G.); Pangal Limache, *Gualterio Looser,* October 12, 1926 (G.); Quebrada del Lúcumo (alt. 10 m.), *G. Looser,* February 28, 1937 (G.). Prov.

[1] The collection, Villa Florida, Paraguay, *Kuntze*, not seen by author.

[2] Cited under *Spergularia rupestris* Steudel, in Flora, 424 (1856).

[3] Cited under *L. arenarium* var. *depressa* by Kindberg, Mon. Lepig. 17 (1863).

[4] Cited under *Arenaria media* by Hooker & Arnott in Hooker's Bot. Misc. iii. 147 (1832).

Santiago: San Antonio, *Asplund* 4301, July 23, 1921 (B., immature); Santiago, *R. A. Philippi* (U. S.);[1] Santiago, *Claude-Joseph* 756, January, 1919 (U. S.); Santiago, *E. E. Gigoux*, December, 1909 (G., immature); Cerro Blanco, vicinity of Santiago, *G. T. Hastings* 165, November 16, 1900 (U. S., U. C., N. Y.); Penaflor, Cerro Manuel Rodriquez, 500 m., *G. Looser* 3730, October 2, 1938 (D. S.); same locality and date, in hot sunny places in very hard soil, *G. Looser* 3731 (D. S., prostrate, matted plant with short internodes and leaves and small seeds); Mercedes, *Philippi*, November, 1888 (Santiago, photo. and fragment in G.). Prov. Colchagua: *Phillippi* dedit 1876 (B.,[2] nearly mature); Rancagua, *Bertero* (Santiago, photo. in G., type of *Arenaria Berteroana*);[3] *Bertero* 59 (Leiden), but locality should be "pascuis sterilibus montis La Leona," Rancagua;[4] Curico, *Claude-Joseph* 5204, January 1928 (U. S., unusually small seeds, only 0.4–0.5 mm. long); Potrero Grande, Curico, *Barros* 252, January 19, 1927 (G.). Prov. Talca: Curepto, *Claude-Joseph* 3875, January, 1926 (U. S.); Ilico, coast of Prov. Talca, *Barros* 272, October 18, 1938 (G.). Prov. Maule: Constitucion, *Claude-Joseph* 2075, December, 1922 (U. S., immature); Maule, *Kuntze*, February 8, 1892 (N. Y., no seeds, marked *Buda rubra* (L.) Dum. by Otto Kuntze).[5] Prov. Concepcion: Concepcion, *Claude-Joseph* 4067, November, 1925 (U. S.); vicinity of Concepcion, *Jaffuel* 2992, December, 1931 (G.); Yumbel, *Claude-Joseph* 5697, January, 1928 (U. S.); Talcaguano, *Chamisso*, 1816 (B., marked by Kindberg but with a name which he never published);[6] in sandy and clay pastures near Concepcion, *Poeppig* 131 (B., Leiden; Berlin specimen marked *Lepigonum macrorhizum* (Réq.) by Kindberg 1861,[7] and *Spergularia marina* (L.), forma calyce capsulam aequante by Rohrbach). Prov. Arauco: sandy knolls in salt marsh, Arauco, *Pennell* 12933, March 6, 1925 (G., F. M.); Arauco, *Barros* 284, November 15, 1938 (G.); Peumo, *Claude-Joseph* 1436, September 20, 1921 (U. S.). Prov. Valdivia: *E. Reed* (K.). Chile, no locality: mittleres Chile, *Claude-Joseph*, November 19, 1922 (B. 2 sheets); Chile, "*Bertero* misit" 1830 (B., immature, marked *Lepigonum villosum* by Kindberg 1861[8] and *Spergularia remotiflora* Steud. ("in sabulosis secus torrentes Valparaiso, Chile, *Bertero*") by Rohrbach); Chile, *Cl. Gay* (B., marked *Arenaria* (*Lepigonum*) *media* by Gay, Fl. Chil.);[9] Chile, *Bridges* (B., marked *Lepigonum arenarium* by Kindberg,

[1] Marked *Arenaria media* L. in same hand as Santiago—label has slit in it, as though it was coll. label, probably Philippi's handwriting.

[2] Marked *Arenaria media* L. but in a different hand from above.

[3] Philippi in Linnaea, xxviii. 673 (1856).

[4] According to Rohrb. in Linnaea, xxxvii. 239 (1871–73).

[5] Cited under *Buda campestris* by Kuntze, Rev. Gen. iii. pt. ii. 13 (1898).

[6] Cited under *Lepigonum arenarium* var. *depressum* by Kindberg, Mon. Lepig. 17 (1863).

[7] Cited as a var. of *L. macrorhizum* with winged seeds and flowers a little smaller by Kindberg, Mon. Lepig. 22 (1863).

[8] Cited under *Lepigonum trachyspermum* by Kindb. Mon. Lepig. 31 (1863).

[9] Probably the Gay spec. cited under *L. arenarium* by Kindb. Mon. Lepig. 17 (1863).

1861); Chile, *Bertero* 58 (G.);[1] Chile, *Bertero* (H. B. 32) (B.); Chile, *Cruickshanks* (K.,[2] mounted on a sheet with *Arenaria media* in Herb. Hooker); Chile, *Bertero* 1431 (Leiden). BRAZIL: "Campos da Bocaina, Sao Paulo 19401 . . . Nov. C."[3], *Glaziou* 19401, 1891–92 (B.). URUGUAY: DEPT. MONTEVIDEO: Sayago, *Herter* 10445, fl. October, 1907–10 (B.); Montevideo, *Arsène-Isabelle* 1838 (K., from Herb. J. Gay, immature); Montevideo, *Sello* 207 (B. 2 sheets, one marked *Spergularia salina* by Rohrbach and the other "*Spergularia marina*, forma capsula vix exserta (sp. *rupestris* Camb.)" by Rohrbach); Montevideo, *Commerson* "(sans nom.)" (Paris, Herb. Jussieu no. 13058, TYPE probably, photo. in G.,[4] immature but flowering); Montevideo, *Commerson* (B. ex Museo Paris 1820, immature, probably type collection); Buenos Ayres and Monte Video, *Commerson* (N. Y., type collection?). ARGENTINA: PROV. SAN JUAN: *R. Roldan Z.*, November 1, 1912 (La Plata). PROV. ENTRE RIOS: Concepcion del Uruguay, *Lorentz*, October, 1875 (B.); Delta del Paraná, arroyo Negro, *Cabrera* 1979, November 24, 1931 (B., La Plata, unusually small seeds, 0.45 mm. long). PROV. SANTA FE: *Cristie* 94 (K.). PROV. BUENOS AIRES: abundant in saline meadows, Avellaneda, *Parodi* 9877, October 10, 1931 (G., immature); low saline places about the Rio Paraná, Campana F. C. C. A., *Burkart* 5664, November 5, 1933 (B., 2 sheets); in saline places, Campana, *Parodi* 8608, October 27, 1928 (G., B.); Buenos Aires, *Morong* 3, 1888–1890 (N. Y.);[5] rich meadows between La Plata and Ensenada, *Cabrera* 1776, October 9, 1931 (G., F. M., immature); Camina (Rio de la Plata), *Cabrera* 2897, October, 1934 (La Plata); Bosque, La Plata, *Cabrera* 3272, October 29, 1934 (La Plata); La Plata, *E. L. Ekman* 1876, October 20, 1907 (U. S., N. Y.); Belgrano, Saavedra and Palermo, *Bettfreund & Koester* 275, 1888 (B., immature); saline fields, Part. Ayul, Estancia Salaberry, *Osten* (B.). NORTH AMERICA: MEXICO: LOWER CALIFORNIA: east slope Coronado Is., *R. B. Cowles* 8, March 29, 1921 (Pam.). CALIFORNIA: San Diego Co.: San Diego, *Cleveland* 526, 1877 (G., marked *S. Clevelandi* by Robinson[6] and *Tissa villosa* by Britton);[6] San Diego, *K. Brandegee*, about 1891 (G., marked *S. Clevelandi* by Robinson);[7] common about dwellings, San Diego, *Brandegee* 3373, April 27, 1903

[1] Cited under *Spergularia villosa* var. *Berteroana* by Rohrb. in Fl. Bras. xiv. pt. ii. 269 (1872) and under *S. rupestris* by Steud. in Flora, 424 (1856).

[2] Cited under *Arenaria media* in Hook. Bot. Misc. iii. 147 (1832).

[3] Locality obtained from Bull. Soc. Bot. France lii. Mém. 3: 35 (1905), where there is a list of plants of central Brazil by *Glaziou*, also his itinerary in Brazil.

[4] Has a tag pasted on top of label which says *Spergula villosa* Poir. Encycl. & Pers. Synops. i. This probably was not put on the sheet at time of naming by Persoon. The specimen, therefore, was probably not annotated by Persoon.

[5] Cited under *Tissa grandis* by Morong & Britt. in Enum. of Pl. Coll. Morong in Paraguay, 53 (1892) in Ann. N. Y. Acad. Sci. vii. 53 (1892).

[6] Cited under *S. Clevelandi* by Robins. in Proc. Am. Acad. xxix. 310 (1894); also cited under *Tissa villosa* by Britt. in Bull. Torr. Club, xvi. 129 (1889) and designated the type of *Tissa Clevelandi* Greene by Jepson, Fl. Calif. v. 494 (1914).

[7] Cited under *S. Clevelandi* by Robins. in Proc. Am. Acad. xxix. 310 (1894).

(G., U. S., Cal. Acad., U. C., Pom., D. S., Notre Dame); National City, *Abrams* 3525, May 18, 1903 (G., U. S., U. C., D. S., Pom.); 1 mile sw. of Otay, on road to Tijuana (Lower Sonoran), *C. B. Wolf* 2088, May 26, 1931 (Cal. Acad., D. S., Pom.). Orange Co.: damp ground, Newport Bay, *L. M. Booth*, 1089, May 24, 1932 (U. C., Pom.). Los Angeles Co.: well established at side of path, Claremont, *I. M. Johnston* 1976, April 25, 1918 (U. S., D. S., Pom.). Santa Barbara Co.: along the streets, near Santa Barbara, *Eastwood* 207, May, 1908 (U. S.); Santa Barbara, *Wooton* 1912 (U. S.). Monterey Co.: Camphora, *Eastwood & Howell* 2186, May 5, 1936 (G., Cal. Acad.). Santa Clara Co.: San Jose, *Mrs. E. A. Bush* 1880 (U. S.); clay ridges in foothills near Stanford Univ., *C. F. Baker* 666, May 27, 1903 (G., U. S., Cal. Acad., Pom., U. C., Notre Dame, distributed as *Tissa argillosa* Greene). San Francisco Co.: Mission Hills, San Francisco, *Michener*, June, 1893 (G., D. S.); San Francisco, *Jepson*, May 20, 1891 (G.); Presidio, San Francisco, *Greene*, May 27, 1893 (U. C.); Presidio, San Francisco, *Heller* 5699, June 12, 1902 (G., D. S., Pom., U. S.); Laurel Hill Cemetery, San Francisco, *Eastwood* 235, June 7, 1912 (G., U. S., Cal. Acad.). Solano Co.: Benicia, *Eastwood* 10509, May 15, 1921 (Cal. Acad.). El Dorado Co.: New York Ravine, *K. Brandegee*, May 8, 1907 (U. C.). San Diego Co.: roadsides, old clearing, La Jolla, *F. E. & E. S. Clements* 48, April 7, 1914 (G., U. C.). Oregon: Multnomah Co.: Lower Albina, *E. P. Sheldon*, July 21, 1902 (Ore.).

No specimen has been located labeled "rather sandy uplands about San Diego," as the type of *Tissa Clevelandi* Greene should be. There is a collection made in San Diego, *Cleveland* 526 (1877), which probably is the one cited by Greene. This collection was later designated as the type of Greene's species by Jepson. In the Greene herbarium at Notre Dame there is a specimen collected by *T. S. Brandegee* in San Diego, April 27, 1903, which was labeled by him and marked typical. There is another of the same collection, marked not typical, which differs only in being more matted and with the leaves growing in every direction. Furthermore, no specimen has been found labeled "gravelly knolls at the Presidio, San Francisco." However, a collection made and labeled by Greene in 1893 from this locality indicates what the plant probably was. All the plants mentioned in the description are alike in all diagnostic characters and to my mind are identical with the South American plants cited above.

Since on the Pacific Coast of North America the plant always occurs around cities or other habitations, one concludes that it was introduced from South America. It has been collected only from the vicinity of the large cities of Montevideo, Uruguay and Buenos Aires and La Plata, Argentina, while it seems very common in south-central

Chile. *One is inclined to think, then, that Chile is its native habitat,* though further work by botanists in South America is needed before this surmise can be verified.

This species shows great variation in habit, from robust sprawling plants to short, delicate, matted ones. These occur sporadically throughout the range, due seemingly to ecological conditions (see *G. Looser* 3730 and 3731, Penafor, Cerro Manuel Rodriguez, examples of both extremes from the same place). Plants with extremely small seeds, 0.4 mm. long, occur sporadically throughout the range and may have small or large capsules. Plants with papillose seeds occur just as often as those with them non-papillose and in the same geographic range.

30. S. COLLINA I. M. Johnst. (PLATE 595, FIGS. 4a–4c). *Annual with open dichotomous branching:* diffuse *stems* 1–5 from the base, 5–25 cm. long; *internodes* below the inflorescence few, 7–35 mm. long, 0.5–1.5 mm. in diameter: *leaves not fascicled,* fleshy, sparsely glandular-pubescent, mucronate, 6–18 mm. long, 1–2 mm. broad; *stipules* inconspicuous, *deltoid,* attenuate, 1.2–2 mm. long: *inflorescence a widely angled leafy cyme,* not sharply differentiated from vegetative parts, with elongated internodes, 1–3 cm. long; *bracts* foliaceous, 0.3–1.5 mm. long: *sepals* ovate-lanceolate, glandular-pubescent, 3.7–4.5 mm. long; *petals* white, ovate, 3.5–5 mm., usually equalling the calyx; *stamens* 10; *styles* 3, separating to the base as flower matures, 0.8–1.2 mm. long: *mature capsules* stipitate, 4–5.5 mm. long, exceeding the calyx by 0.3–1 mm.: *fruiting pedicels* filiform, strongly reflexed, the lower 8–22 mm. long: *seeds* 0.6–0.8 mm. long, *black, rounded at the summit, deeply sculptured in vermiform pattern with crowded, long, black papillae,* not winged.—Contrib. Gray Herb. lxxxi. 89 (1928); Macbride, Field Mus. Pub. Bot. xiii—Fl. Peru Pt. 2, no. 2, 630 (1937). *Drymaria molluginea* sensu Weberbauer in Engler & Drude, Veg. der Erde, xii. 144, fig. 9 (1911), non *Alsine molluginea* Lagasca (1815). SOUTH AMERICA: open sandy hills on coast of Peru in Dept. Arequipa. PROV. ISLAY: DEPT. AREQUIPA: lower edge of green belt on desert hills in back of port, Mollendo, *Johnston* 3568, October 16, 1925 (G. TYPE, F. M.); after October rains, Mollendo, *A. S. Hitchcock* 22355, November 17, 1923 (U. S.); Atico, *Raimondi* 11609, November, 1863 (B.). MAP 11.

This plant was illustrated by Weberbauer in Engler & Drude, Veg. der Erde, xii. 144, fig. 9 (1911) but erroneously called *Drymaria molluginea* Didr. The latter name refers to a Mexican plant with bifid petals and has its source from plants grown in the Hortus Regius, Madrid, from seeds collected by *Sessé and Mocino* in "Nova Hispania." Lagasca called it *Alsine molluginea*[1] (photo. and drawings of

[1] Lagasca, Gen. et Spec. 13, no. 170 (1815).

seeds and stipules in Gray Herb.) but it later became *Drymaria molluginea* (Lag.) Didr.[1]

31. S. **Spruceana**, spec. nov. (TAB. 595, FIG. 2a–2e). Perennis: radice centrale ad 1 cm. crassa: caudice ramoso vel simplice, caulibus multis gracilibus diffusis, 3–30 cm. longis; internodiis caulis partis efloriferi gracilibus, 0.8–1.5 mm. crassis, 3–43 mm. longis: foliis plerumque fasciculatis linearibus complanatis mucronatis margine villoso-glanduloso excepto glabris, 3–45 mm. longis, 0.5–1 mm. latis: stipulis scariosis albidis triangulari-acuminatis, 3–6 mm. longis, basi vel paullo supra basin connatis: floribus in cymam contractam dispositis; bracteis infimis longis foliosis, ad 15 mm. longis supremis minimis vel obsoletis; internodiis saepe sparse villoso-glandulosis, inferioribus 6–15 mm., superioribus brevissimis, 1.5–3 mm. longis: sepalis lanceolatis, glabris, plerumque glandulis minutis pallidis puncticulatis praecipue in parte superiore, margine scariosis, recurvatis, apice incurvato saepe cucullato, 3.2–4.8 mm. longis; petalis albis ovatis, 2–2.5 mm. longis; staminibus 10; stylis 3, ad basim divisis: capsulis maturis 3–4.5 mm. longis, sepala aequantibus vel eis 0.1–0.5 mm. brevioribus: pedicellis fructiferis haud reflexis, infimis, 2–5 mm. longis: seminibus pallide brunneis lucidis, lineis vermiformibus intertextis sculptis, saepe verrucis minutis elongatis haud papillatis, exalatis, vel saepe appendice parva scariosa ornatis, 0.5–0.6 mm. longis.—SOUTH AMERICA: found only in the high Andes of Ecuador. ECUADOR: 9937 ft., Quito, Prov. Pichincha, *Jameson* (K.); vicinity of Quito, Latacunga or Ambata in sandy places, *Sodiro* 123 (B.); Quitensian Andes, *Couthouy*, 1855 (G., N. Y.); Tixan, Prov. Chimborazo, *Rose* 22403, August 27, 1918 (G., U. S.); open ground Urbina, paramo on east flank of Mt. Chimborazo, Prov. Chimborazo, alt. 3600 m., *A. S. Hitchcock* 22039, October 5, 1923 (U. S.); in Andibus Ecuadorensibus, *R. Spruce* 5444, 1857–9 (G. TYPE, K., B., F. M.). MAP 26.

The name *Spruceana* was suggested to me by an unpublished note of Britton's on the *Spruce* collection in the Gray Herbarium. It is a pleasure to name it after RICHARD SPRUCE, a courageous explorer and an accurate observer.

32. S. **colombiana**, spec. nov. (TAB. 596, FIG. 4a et 4b). Perennis vel annua?: caulibus saltem 12–25 mm. longis, multi-ramosis: internodiis caulis partis efloriferi glabris, 6–20 mm. longis, 0.4–1.2 mm. crassis: foliis paululum fasciculatis, 1–2 foliis axillaribus, mucronatis, glabris, 15–20 mm. longis, 0.6–0.8 mm. latis; stipulis late lanceolato-acuminatis, 4.5–5.5 mm. longis: floribus in cymam laxam ramosam dispositis; internodiis infimis 7–15 mm. longis, 0.4–0.6 mm. crassis; bracteis foliosis, supremis minimis: sepalis linearibus, sparse villoso-glandulosis, 4.2–5.6 mm. longis; petalis albis, ovatis, 2.8–4 mm. longis, sepalis 1.6 mm. brevioribus; staminibus 5–10; stylis 3, ad basim

[1] Didr. in Linnaea, xxix. 738 (1859).

divisis, 0.6 mm. longis: capsulis pene maturis, 5–5.2 mm. longis sepalis aequantibus vel eis 1 mm. longioribus pedicellis fructiferis filiformibus, villoso-glandulosis, patentibus, 5–7 mm. longis: seminibus immaturis, lineis vermiformibus intertextis sculptis, alatis, ala albida, scariosa, 0.2 mm. lata.—South America: known as yet only from Bogota, Colombia. Colombia: Prov. Bogota: Cordillera de Bogota, 27 m. alt., New Granada, *J. Triana*, 1851–1857 (K. type, N. Y.); *Linden* 178 (K.). Map 27.

33. S. platensis (St. Hil. & Adr. Juss.) Fenzl (Plate 595, figs. 3a–3d and map 28). Annual: *caudex* bearing 3–many diffuse stems, usually many, 5–30 cm. long; *internodes of stem below the inflorescence* glabrous, slender, 8–40 mm. long, 0.4–1.4 mm. in diameter: *leaves* filiform, glabrous, mucronate, usually not fascicled or, if so, with only 1–2 leaves at the axils, 10–40 mm. long, 0.4–1.2 mm. broad; *stipules deltoid*, acuminate, as long as broad or slightly longer than broad, 1.5–3.5 mm. long: *inflorescence a much compounded cyme, glabrous throughout; internodes* 3–28 mm., usually 7–15 mm. long; *bracts* usually minute, 0.5–10 mm., usually 0.5–4 mm. long: *sepals broadly lanceolate, bluntly tipped,* 0.8–1.6 mm. long; *petals* minute, white, narrowly ovate, 0.6–1 mm. long, as much as 0.4–1 mm. shorter than the calyx; *stamens* 5; *styles* 3, erect when young, separated nearly to the base, 0.3–0.4 mm. long: *mature capsules* 1.4–2.6 mm., usually 1.8–2.2 mm. long, as much as 0.4–1 mm., usually 0.6–0.8 mm. longer than the calyx: *fruiting pedicels* filiform, never reflexed, the lowest 2–8 mm., usually 4–6 mm. long, the upper ones very short: *seeds* 0.35–0.4 mm. long, *light or reddish brown, often with a silvery tinge, often angular because of compression in the capsule, deeply sculptured in interwoven vermiform pattern, usually covered with large, brown, glandular, often cup-shaped papillae,* not winged.—Ann. Wien. Mus. ii. 272, in note (1839); Rohrb. in Mart. Fl. Bras. xiv. ii. 267, pl. 61, fig. 2 (1872); Rohrb. in Linnaea, xxxvii. 228 (1871–73); Robins. in Gray, Synop. Fl. i. 251 (1897); Arech. in Anal. Mus. Nac. Montevideo, iii. (Fl. Uruguay i.) 93 (1901); Jepson, Fl. Calif. 495 (1914) and Man. Fl. Pl. Calif. 361 (1923); Munz, Fl. So. Calif. 163 (1935). *Balardia platensis* St. Hil. & Adr. Juss. in St. Hil. Fl. Bras. Mer. ii. 181, pl. 111 (1829); C. Gay, Fl. Chile, ii. 524 (1846). *Lepigonum gracile* Wats. in Proc. Am. Acad. xvii. 367 (1882). *Tissa gracilis* (Wats.) Britt. in Bull. Torr. Bot. Club, xvi. 128 (1889); Small, Fl. Se. U. S. 418 (1903). *Buda platensis* (St. Hil. & Adr. Juss.) Kuntze, Rev. Gen. i. 50 (1891). *Spergularia angolensis* Philippi in Anal. Univ. Chile, lxxxi. 771 (1892). *S. gracilis* (Wats.) Robins. in Proc. Am. Acad. xxix. 311 (1894). *Tissa platensis* (St. Hil. & Adr. Juss.) Hassler in Bull. Herb. Boiss. sér. 2, vii. 931 (1907). *T. platensis* subsp. *septentrionalis* Hassler[1] l. c. *T. platensis* var. *septentrionalis* (Hassl.) Hassler, Contrib. Fl. Chaco

[1] This variety must be the same as the species because the characters given, such as stipules widely ovate, petals deficient, style slightly joined at the base, are not sufficient to separate this from the species nor do they characterize var. *Balansae*.

Argentino-Paraguayo, pt. i. (Fl. Pilcomay.) 58 (1909). *S. texana* Hy, Rev. Gen. Bot. xxv. 316 (1913) in obs.[1] *Alsine platensis* (St. Hil. & Adr. Juss.) House in Am. Midl. Nat. vii. 134 (1921). *S. platensis* var. *septentrionalis* (Hassl.) Hauman & Irigoyen in Anal. Mus. Nac. Hist. Nat. Buenos Aires, xxxii. 193 (1923).—South America: common in the Argentine, and probably introduced in central Chile, southern California and Texas. Brazil: no locality, "*St. Hilaire* misit," 1830 (B., marked *Balardia platensis*, probably in Cambessedes' handwriting). Argentina: Prov. Corrientes: salt marshes, Cado de Aposo, *Niederlein* 1171, October 8, 1886 (B.). Prov. Entre Rios: on muddy ground on the banks of the river Gualeguagehn, Concepcion del Uruguay, *Lorentz* 1203, October, 1877 (B.); Medanos, *Burkart* 3572, December 3, 1930 (B.); Concepcion del Uruguay, *Lorentz* 1707, September, 1877 (B.); Delta Paraná, Arroyo Brazo Largo, *Burkart* 8295, December 12, 1937 (F. M.); Islas Victoria, *Burkart* 8623, December 26, 1937 (F. M.); Fontana (Chaco), *Meyer* 2375, November, 1937 (G., D. S.). Prov. Santa Fe: Malabrigo, F. C. S. F., *Burkart* 5749, November 12, 1933 (B.). Prov. Tucumán: on the banks of a dry lake, alt. 300 m., Chanar Pozo, Dept. Leales, *Venturi* 413, September 9, 1919 (U. S.); alt. 450 m. Rio Sali, Dept. Capital, *Venturi* 1908, September 13, 1922 (G., U. S., La Plata); rich meadows, 3000 m. alt., Sierra de Cajou, Dept. Tafi, *Venturi* 10055, January 3, 1929 (U. S.). Prov. Buenos Aires: virgin pastures, Avellaneda, *Parodi* 5847, October 18, 1924 (B.); low brackish places about the R. Paraná, Campana, F. C. C. A., *Burkart* 5655, November 5, 1933 (B.); low flood-plain of R. Paraná, Isla Mariel, *Burkart* 3052, December 6, 1928 (B.); Buenos Aires, *Bettfreund* 188b + 130, misit 1888 (B.); Buenos Aires, *Tweedie* (K.); wet land, Abasto, near La Plata, *Cabrera* 2388, October 19, 1932 (La Plata); Bahia Blanca, *Darwin* (K.). Prov. Rio Negro: Rio Negro, *Aug. Scala* 47 (n. 104 Herb. Scala Rio Negro), January, 1916 (La Plata); in irrigated ground, General Roca and vicinity, Rio Negro Valley (250–360 m. alt.), *Walter Fischer* 166, Nov. 14, 1914 (G., U. S., N. Y., F. M.). Locality not found: Las Palmas, *Niederlein* 128, Aug. 30, 1892 (B.). Locality not given: *Hicken* 486 (Chloris Platensis Argentina) (N. Y., Cal. Acad.). Chile: Prov. Santiago: in plateis urbis, Santiago, *R. A. Philippi*, pl. Chilens. ed. *R. F. Hohenacker* 625 (K.); in the city of Santiago, *Philippi* 1250 (B., marked *Balardia platensis*); *Philippi* ded. 1888 (B.); malza frecuente, Santiago, *Looser* 89, November 10, 1924 (G.). Prov. Bio-Bio: Dept. Angol: Angol, *Philippi* 2284, November, 1887 (Santiago, photo. and fragment in G., type of *S. angolensis* Philippi). No definite locality given: Chile (Leiden), no collector given. North America: Texas: wet sands near Dallas, *Reverchon*, April (Curtiss-N. Am. pl. no. 333* and Texas Flora 72) (G., U. S., B., one of the Berlin sheets and the Gray collection marked *Lepigonum*

[1] Belongs to this species because of the citation, Texas, *Reverchon*, and white flowers and naked cymes, which in combination do not apply to any other species of the region.

gracile[1] by Watson); sandy lands, common, Dallas, *Reverchon* (G.); common in wet places, Columbia, Brazos R., *Bush* 79, April 20, 1900 (G., U. S.). CALIFORNIA: Riverside Co.: desiccating mudflat, one half mile south of Lake Elsinore, *Munz* 5070, April 29, 1922 (Pom., U. C.). Los Angeles Co.: dried ponds near Compton, *Nevin & Parry*, 1881 (G., marked *Lepigonum gracile* by Watson)[2]; Los Angeles, *Parry* 15, 1881 (G., U. S.,[3] marked *L. gracile* by Watson); low brackish flats near coast, Bixby, *Braunton* 436, June 20, 1902 (U. S.), marked *Lepigonum gracile* by Watson); on adobe mesa between Rivera and Florence, *Abrams* 3252, April 14, 1903 (G., U. S., D. S., U. C., Pom.); Inglewood, *Abrams* 1494, April 12, 1901 (D. S., Pom.). San Diego Co.: Carriso Creek, *Brandegee*, April 20, 1893 (U. C.); Otay, *Orcutt* 1201, May 13, 1882 (G.).[3]

S. platensis is quickly separated from all other Spergularias by its delicate habit, very small and numerous capsules, and much compounded cyme. However, there are no characters sufficiently important to warrant placing it in a separate genus such as *Balardia* St. Hilaire & Adr. Juss.[4]

The geographical distribution of this species is very peculiar. It is evident that Argentina is its native home and that it was introduced into Chile, since it has only rarely been collected there and from civilized places. It also seems probable that the Californian and Texan stations represent introductions, though, to prove the point, more collections should be made, especially with historical information regarding the localities at hand.

34. Var. **Balansae**, var. nov. (TAB. 595, FIG. 3e et 3f). Perennis: caudice nodosa, 1–2 caulibus gracilibus erectis, 12–18 cm. longis; internodiis caulis partis efloriferi gracilibus, glabris, 7–24 mm. longis, 0.4–0.6 mm. crassis: foliis vulgo haud fasciculatis vel interdum 1–2 foliis axillaribus, filiformibus, glabris, mucronatis, 15–30 mm. longis, 0.4–0.8 mm. latis; stipulis minimis, triangularibus, tam longis quam latis, 1.2–1.6 mm. longis: floribus in cymam patentem simplicem glabram dispositis; internodiis filiformibus, infimis 4–12 mm. longis; bracteis 0.6–2.2 mm. longis: sepalis lanceolatis, apicibus obtusis, glabris, 2.2–2.8 mm. longis; petalis albis, anguste ovatis, 1.2–1.4 mm. longis; staminibus 5, sepalis adversis; stylis 3, 0.4 mm. longis, ad basim divisis: capsulis maturis 3.2–3.8 mm. longis, sepalis 1–1.2 mm. longioribus; pedicellis fructiferis filiformibus, haud reflexis, infimis

[1] Cited as Curtiss no. 333*, under *Lepigonum gracile* by Sereno Watson in Proc. Am. Acad. xvii. 367 (1882), and also under *Tissa gracilis* by Britt., in Bull. Torr Bot. Club, xvi. 128 (1888).

[2] Cited under *Lepigonum gracile* by Sereno Watson, but as collected only by *J. C. Nevin*.

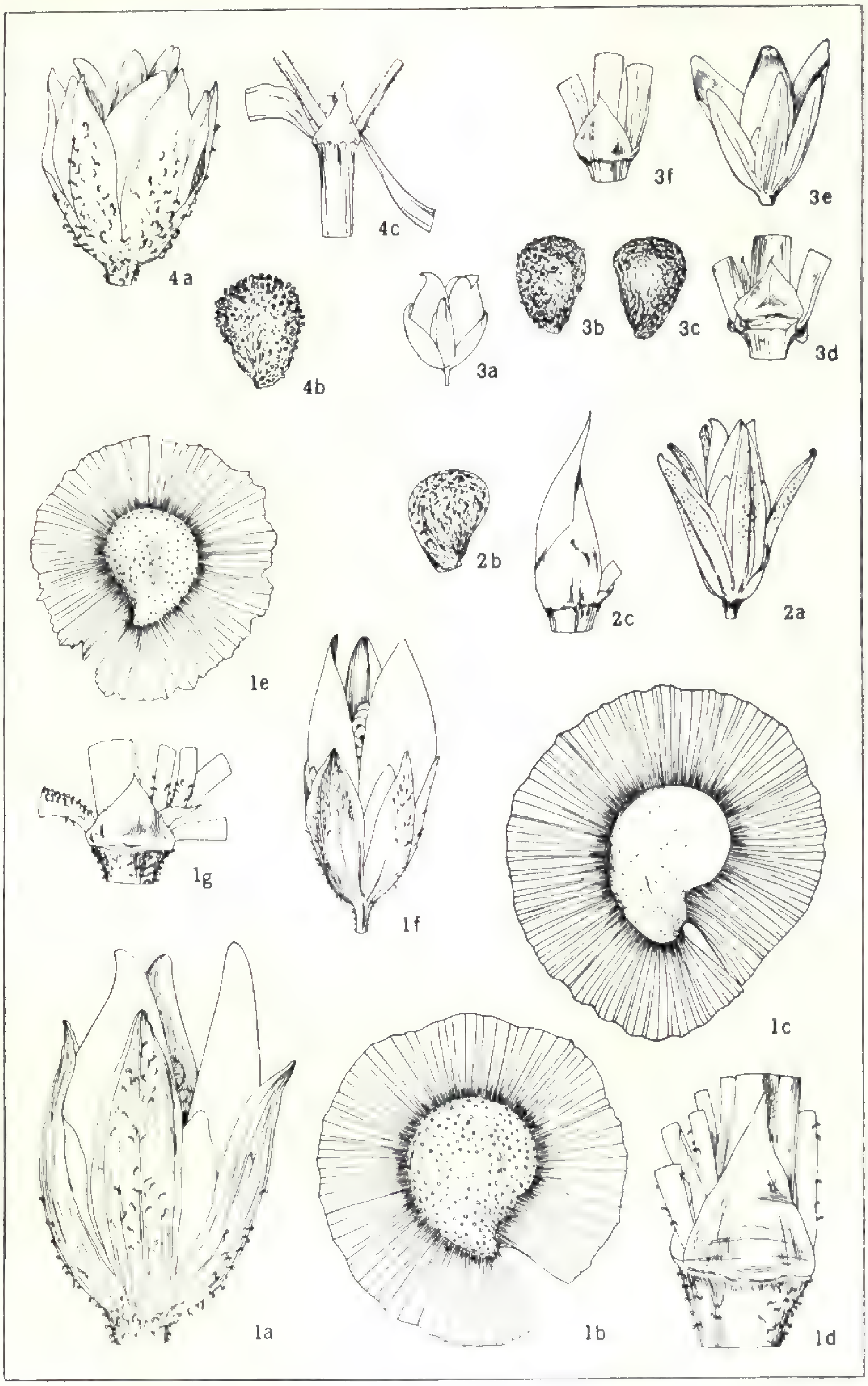
[3] Cited under *Tissa gracilis* (Wats.) Britton in Bull. Torr. Bot. Club, xvi. 128 (1888).

[4] In St. Hilaire, Fl. Bras. Mer. ii. 180, t. 111 (1829).

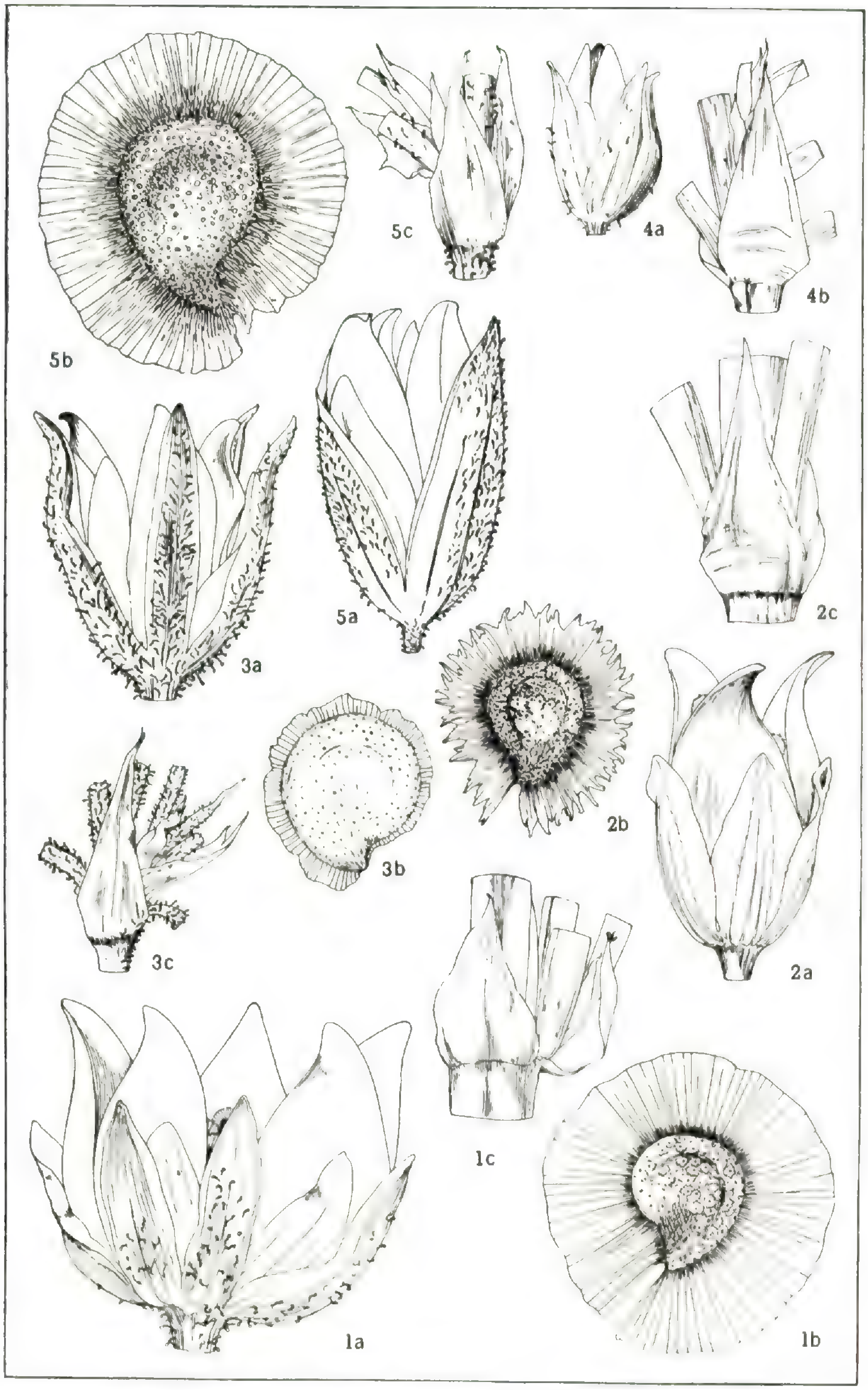
7–10 mm. longis: seminibus eis var. typicae similibus.—South America: known only from Paraguay. Paraguay: in the prairies in impermeable clay soil, *Balansa* 2271, May 27, 1874 (K., type); Villa Fonda, *Kuntze* (N. Y., marked *Buda campestris* by Otto Kuntze).

The variety differs from the typical form of the species in erect habit, perennial root, smaller stipules, simple cyme, and larger sepals and capsules. It is similar in its lack of pubescence, shape of stipule, number of stamens, length of style, leaves, petals, and, most important of all, in having exactly the same seeds. The latter fact is the main reason for giving it varietal rather than specific rank.

35. S. ramosa Camb. (Plate 595, figs. 1a–1d and map 29). Perennial with a heavy ligneous central root: *caudex* well developed, knotty and branched, bearing from 1–15 nearly always erect stems, 8–37 cm. long, often budded from those of the previous season; *internodes of the stem below the inflorescence* usually glabrous though sometimes glandular-pubescent, 4–35 mm., usually 8–20 mm. long, 0.4–2.5, usually 0.8–2 mm. in diameter: *leaves fascicled*, filiform, mucronate, 10–45 mm. long, 0.5–1 mm. wide, usually glabrous, occasionally densely glandular-pubescent; *stipules lanceolate-acuminate, very broad at the base, at least twice as long as broad*, 2.5–7 mm., usually 3–5 mm. long: *inflorescence always glandular-pubescent throughout* with *internodes* roughly equalling or somewhat shorter than those below, 5–30, usually 10–20 mm. long, 0.4–1 mm. in diameter with minute *bracts* 1–4, usually 1.2 mm. long: *sepals* broadly linear-lanceolate, with a narrow scarious margin, always glandular-pubescent, 4.5–10 mm., usually 6–8 mm. long; *petals* white, ovate, 3–8 mm., usually 4–6 mm. long, 0.5–4 mm., usually 1–3 mm. shorter than the calyx; *stamens* 6–9; *styles* 3, parted to the base, 1–1.4 mm. long: *mature capsules* with valves often purple-tinged inside at the apex, 6–11.5 mm., usually 7–9 mm. long, occasionally equal to the calyx but usually 0.5–4 mm., commonly 0.5–2 mm. longer than the calyx: *fruiting pedicels* never reflexed, the lower 5–21 mm. long: *seeds* 0.6–0.9 mm., usually 0.7–0.8 mm. long, *light brown, dull, rounded in outline, surface usually smooth but sometimes covered with regularly arranged, brownish papillae, surrounded by a broad, shining, entire wing, often tinged with brown*, 0.3–0.7 mm., usually 0.4–0.6 mm. wide.—Camb. in St. Hil. Fl. Bras. ii. 178 (1829); Gray, Bot. Wilkes Exped. 1838–42, i. 121 (1824); Kindb. Synop. 16 (1856) (though Kindberg questioned whether it was a *Spergularia* and placed it under species excluded); Arech. in Ann. Mus. Nac. Montevideo, iii. (Fl. Uruguay, i.) 95 (1901). *Arenaria grandis* sensu HBK., Nov. Gen. et Sp. vi. 24 (1823), ex char., "Vidi in A. grandi: stamina 10 et stylos tres; . . .", non *Spergula grandis* Pers. (1805). *Arenaria grandis* sensu DC. Prod. i. 401 (1824), in small part, including only the reference HBK., non *Spergula grandis* Pers. (1805); Gay, Fl. Chile, i. 267 (1845), for the most part, excluding



SPERGULARIA: stipule, calyx and capsule, × 5; seeds × 25.
S. RAMOSA, figs. 1a–1d; var. DIFFUSA, figs. 1e–1g. S. SPRUCEANA, figs. 2a–2c. S. PLATENSIS, figs. 3a–3d; var. BALANSAE, figs. 3e and 3f. S. COLLINA, figs. 4a–4c.



SPERGULARIA: stipule, calyx and capsule × 5; seeds × 25.
S. GRANDIS, figs. 1a–1c. S. LEVIS, figs. 2a–2c. S. RUPESTRIS, figs. 3a–3c. S. COLOMBIANA, figs. 4a and 4b. S. PAZENSIS, figs. 5a–5c.

only reference to DC. in part, non *Spergula grandis* Pers. (1805). *Spergularia macrocarpa* Presl, Rel. Haenk. ii. 9 (1831), excluding synonyms Pers. and DC. *S. racemosa* G. Don, Gen. Hist. Dichl. Pl. i. 426 (1831), probably an error in spelling for reference is made to Camb. *S. grandis* sensu G. Don, l. c., in part, including synonym *Arenaria grandis* HBK. and excluding *S. grandis* Pers., non *Spergula grandis* Pers. (1805); sensu Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 271 (1872), in part (including the 3-merous element of the description and the synonyms *Arenaria grandis* HBK. and DC. "forma trigyna," *Spergularia macrocarpa* Presl, *Lepigonum grande* (Pers.) Kindb. and *Lepigonum arenarium* Kindb. in part (see the synonymy of *S. villosa*), and excluding the 5-merous element of description and all other synonyms, all of which elements belong with *S. ramosa, q. v.*), non *Spergula grandis* Pers. (1805); sensu Rohrb. in Linnaea, xxxvii. 236 (1871–73), in part, for the same reasons as above, non *Spergula grandis* Pers. (1805); sensu Macbride, Field Mus. Pub. Bot. xiii.—Fl. Peru pt. 2, no. 2, 631 (1937) (because collection cited is from Huanuco: Montana, *Haenke*), non *Spergula grandis* Pers. (1805). *Spergula racemosa* D. Dietr. Syn. Pl. ii. 1599 (1840), probably likewise an error, for reference is made to Camb. *Lepigonum grande* sensu Kindb. Syn. Lepig. 15 (1856), including ref. Presl and, in part, DC., non *Spergula grandis* Pers. (1805). *L. arenarium* Kindb. Mon. Lepig. 17, t. i, fig. 3 (1863), in part (including references HBK. and *S. ramosa* Camb., and the citations Montevideo, *Sello*, and Rio Negro, *Wilkes Exp.* and the right-hand plant in the figure including the entire-winged seed; excluding the remaining references, citations (*Lambert* ?), and illustration, all of which belong with *S. villosa*). *Lepigonum trachyspermum* Kindb. Mon. Lepig. 31, t. ii, fig. 16 (1863), in part (including Brazilian specimens and in part Montevideo, *Sello*, spec.; excluding references Camb. and Pers. and specimen, Chile, *Bertero*, which is *S. villosa*, and part of Montevideo, *Sello*, which is *S. rupestris*, and Maldonado?). *S. villosa* var. α *genuina* Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 268, t. 61, fig. 1 (1872), in part (including only the specimen, Sorata, *Mandon* 946, and the figure; excluding the right-hand, narrow-winged seed which is from *S. rupestris*); Rohrb. in Linnaea xxxvii. 238 (1871–73), in part (including *Mandon* 946 and possibly part of the *Sello* collections; excluding all references which apply to *S. villosa* and *S. rupestris*). *S. media* 2. "Forma capsula calycem aequante vel vix superante," Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 271 (1872), in part (including the synonyms *S. ramosa* Camb. and *Spergula racemosa* Dietr.; excluding the remainder, which belong with *S. villosa*); Rohrb. in Linnaea, xxxvii. 243 (1871–73), in part, for same reasons as above. *Buda marina* sensu Kuntze, Rev. Gen. iii. pt. ii. 13 (1898), because of citation Patagonia, *Moreno and Tonini* 343, non *Arenaria rubra* var. *marina* L. (1753). *Buda grandis* sensu Kuntze, l. c. (1898), in part (including citations, Rio Santa Lucia, Uruguay and Cochabamba, Bolivia;[1] excluding *Hauthal* 661, and

[1] Another collection cited here, Ceres, Cordoba, though not examined by the

Sierra de Solis, which are *S. levis*), non *Spergula grandis* Pers. (1805); sensu Macloskie in Rep. Princeton Univ. Exp. Patagonia, viii. pt. 1, 395 (1905), non *Spergula grandis* Pers. (1805). *S. villosa* sensu Macbride, Field Mus. Pub. Bot. xiii—Fl. Peru, ii. 633, probably (because he says the seeds are yellow, pedicels erect and spreading, and cites Mart. Fl. Bras. xiv. pt. 2, pl. 61, none of which data apply to *S. villosa* (Pers.) Camb.),[1] non *Spergula villosa* Pers. (1805).—South America: common in most of Argentina and southern Uruguay and adjacent southeastern Brazil, also local in Bolivia. Brazil: Brasilia meridionalis, *Sello* 3107[2] (B., seeds papillose on rim, marked *Lepigonum villosum* Kindb. 1861);[3] *Sello* 3107a[2] (B., seeds papillose on rim); Brazil, *Sello* 1840[4] (K., 2 of the plants only, seeds smooth); Porto Alegre, Rio Grande do Sul, *Tweedie* (K., part of coll. only, seeds papillose). Brazil: no locality, *Sello* (Leiden). Uruguay: Dept. Canelones: river shores, Santa Lucia, *H. M. Smith* 53, November 14, 1922 (U. S., seeds smooth); gravelly, dry, exposed soil, Independencia, *Herter* 652, November, 1926 (U. S., seeds papillose). Dept. Montevideo: Montevideo or R. v. Campos-Vitoria, *Sello* d. 2 (B., 5 sheets, K.; only part of most of the sheets, seeds papillose); Montevideo, *Sello* d. 394 (B., 2 sheets; only part of one sheet, seeds hubbled; marked *Lepigonum villosum* (Camb.) by Kindberg, 1861); Montevideo, *Sello* (B., seeds papillose; marked *Lepigonum villosum* by Kindberg, 1861); Montevideo, *Sello* (B., only part of the specimens, seeds papillose; marked *Lepigonum villosum* Kindb., 1861); Montevideo, *Sello* (B., seeds papillose, marked *Lepigonum marinum* by Kindberg, 1861); Montevideo, *Capt. King* (K., immature but has 3 styles, mounted on a sheet with *Arenaria bonariensis* in Hooker Herb.); Montevideo, *Gibert* 410, 1866 (K., seeds smooth); Montevideo, *Sello* d. 2178 (B., seeds smooth, marked *Lepigonum arenarium* by Kindberg, 1861);[5] in pasture lands, near Montevideo, *Safford*, October 24, 1886 (U. S., seeds papillose); exposed dry ground, Arroyo Piedras, *Herter* 652[b], February 5, 1928 (N. Y., seeds papillose only on rim); Pocitos, *H. M. Smith* 15, October 14, 1922 (U. S., seeds smooth); exposed soil, Pocitos, *Herter* 159, November, 1924 (G., B., U. C., seeds smooth); Cerro de Montevideo, *Gibert* 158, March, 1867 (K., seeds hubbled); dry, exposed, gravelly and sandy soil, Cerro, *Herter, Schulz, and Strahl* 650[b], October, 1925 (G., N. Y., F. M., U. C., immature). Dept. San José: sandy ground, Santa Lucia, *Osten* 21691, November 25, 1929 (G., seeds papillose). Dept. Colonia: around

author, may be the same as others made by *Kuntze* in Cordoba, which are *S. ramosa* var. *diffusa*.

[1] It is interesting to note that neither *S. villosa* nor *S. ramosa* grow in Peru.

[2] Locality found in Urban in Engler, Bot. Jahrb. xvii. 196 (1893); "2994–3330 ebenda von Encrusilhada nach Caçapana und Rio S. Barbara (Nov. Dec. 1825)."

[3] Cited by Kindberg under *L. trachyspermum*, Mon. Lepig. 31 (1863).

[4] Locality found in Urban l. c.: "d.1504–1853—ebenda vom Rio Pardo über Caçapana nach Bagé (Dec. 1823, Jan. 1824)."

[5] Cited under *Lepigonum arenarium* by Kindb. Mon. Lepig. 17 (1863).

Carmelo, *Cabrera* 3189, December 5, 1934 (La Plata, seeds smooth); high lands, Riachuelo, *Cabrera* 3298, April, 1935 (La Plata, seeds papillose); downs, Riachuelo, *Cabrera* 3903, November 15, 1936 (F. M., rim of seed papillose). Uruguay, locality not found: Rio Santa Lucia, *Kuntze*, November, 1892 (N. Y., seeds papillose, marked *Buda grandis* by Kuntze);[1] Uruguay, *St. Hilaire* (Paris, photo. in G.), probably not the type.[2] ARGENTINA: PROV. JUJUY: Dept. Tumbaya: alt. 2400 m., slopes of mts., Volcan-Cerro, Alta Cordoba, *Venturi* 4900, February 17, 1927 (G., U. S., F. M., Cal. Acad., La Plata, seeds smooth). PROV. CATAMARCA: Sancho, Dept. Andalgalá, *Jörgensen* 1607, November 15, 1915 (G., U. C., smooth seeds); Quebrada de Yacutula, *Schickendantz* 304, March, 1878 (?) (B., smooth seeds); at the summit of Cuesta Muschaca, *Schickendantz* 264, February, 1876 (B., seeds smooth); Candada, Dept. Andalgalá, *Jörgensen* 1607, February, 1897 (U. S., seeds smooth). PROV. TUCUMÁN: 2600 m. alt., Estancia Las Pavas, Dept. Chicligasta, *Venturi* 9470, March 14, 1924 (U. S., smooth seeds), and 6886, January 16, 1925 (U. S., smooth seeds); Valle de Tafi, *C. Bruch*, 1908 (La Plata; smooth seeds); Sierra de Tucuman, La Ciénaga, *Hieronymus & Lorentz*, January 10–17, 1874 (B., seeds smooth). PROV. CORRIENTES: Wald vom Riachuelo an Corrientes, *Niederlein*, January 19, 1883 (B., papillose seeds). PROV. SANTA FE: Ceres in Dist. San Cristobal, *Grippel*, October, 1892 (N. Y., papillose seeds; marked *Buda grandis* by Otto Kuntze); around Estancia Leives, Sierra Ventana, *Alboff*, November, 1895 (La Plata, seeds smooth). PROV. CORDOBA: Cordoba, *Lorentz*, November, 1877 (K., smooth seeds); Estancia Germania near Cordoba, *Lorentz* 79, June–December, 1874 (B., seeds smooth); Cordoba, *Galander*, November 19, 1880 (B. One sheet has smooth seeds, the other papillose); Cordoba, *Galander*, November 23, 1880 (B., seeds smooth); Cordoba, *Lorentz* 485 (B., only part of the coll., seeds smooth); Cordoba, *Hieronymus*, October, 1877 (B., smooth seeds); Cordoba, *Lorentz* 324^{b}, December, 1870 (B., seeds smooth); Lagunas de Peitiado around Cordoba, *Galander*, February 25, 1881 (B., smooth seeds); Potrero de Laya, Sierra Chica, *Galander*, November 31, 1879 (B., seeds smooth); Estancia La Reduccion, Sierra Chica, *Burkart* 7182, December 26, 1935 (G., seeds smooth); Rio Zeballas, Sierra Chica, *Galander*, January 17, 1878 (B., seeds smooth); *Hieronymus*, Sommer, 1874–75 (B., seeds smooth); Cuesta de Copina, las Envenadas Sierra Achala, *Hieronymus*, January 8, 1876 (B., seeds smooth); Cuesta de Ayel, Sierra Achala, *Hieronymus*, January 12–14, 1876 (B., seeds smooth); San Miguel, Sierra Grande, *Hieronymus*, March 27, 1875 (B., seeds smooth); 1400 m. alt., Copina, Sierra Grande, *Burkart* 7181, December 29, 1935 (G., seeds smooth);

[1] Cited under *Buda grandis* by Kuntze, Rev. Gen. iii. pt. ii. 13, Sept. 28 (1898).

[2] Montevideo, the locality given in Fl. Bras. is not on label; the + Cambess. Uruguay on the label is in the handwriting of Spach, and the *S. ramosa* is in secretarial handwriting. Data by courtesy of Mr. C. A. Weatherby.

sands on the banks of the Rio Primavera, Cordoba, *Lorentz* 324[b], 1870 (B., seeds smooth); San Francisco, *Lorentz* 324, February, 1871 (B., 2 sheets, seeds smooth); Prov. Cordoba, no locality, *Lossen* 36, January 25 (G., F. M., B.; only Field Museum coll. mature, seeds smooth); between S. Vicente and the estate of Rueda, Sierra Chica *Kurtz* 6585, December 14, 1889 (La Plata, seeds smooth). Prov. La Rioja: between Cueva de la Mesada and Sucrucijada, Sierra Famatina, *Hieronymus & Niederlein* 528, January 31, 1879 (B., seeds smooth); Vallecito, Sierra Famatina, *Hieronymus & Niederlein* 611, January 21, 1879 (B., seeds smooth); Las Tranquitas, Sierra Famatina, *Hieronymus & Niederlein*, February 10, 1879 (B., immature). Prov. San Juan: Cuesta Nueva, *Hosseus* 2540a, February 28, 1927 (B., immature). Prov. San Luis: Cerro Retana, Sierra de San Luis, *Vignati* 294, January, 1934 (La Plata, seeds smooth); Estancia Grande, *Vignati* 68, January, 1934 (La Plata, seeds smooth); Rio de las Barranquitas, *Vignati* 235, January, 1934 (La Plata, immature). Prov. Buenos Aires: low, brackish ground about the Rio Paraná, Campana F. C. C. A., *Burkart* 5663, November 5, 1933 (B., seeds smooth); in barren pastures, Campana, *Parodi* 8604, October 27, 1928 (G., B., seeds bubbled or smooth); in barren ground, Campana, *Parodi* 11326, November 21, 1933 (G., seeds smooth); in sandy ground, Isla Mariel, Buenos Aires, *Parodi* 8717, December 10, 1928 (G., papillose seeds); in the hills of Curumalán Pigüe F. C. S., *Burkart* 4836, November 14, 1932 (B., seeds smooth); Cerros on the Pigüe, *Scala*, November 7, 1928 (La Plata, seeds smooth); Cerros and Laguna de Puan, *Scala*, November 10, 1928 (La Plata, seeds smooth); Pergamino, *Parodi* 6635, November 12, 1925 (B., seeds smooth); saline places in the fields, Partido Azul, Estancia Salaberry, *Osten* 205, mid-November, 1886 (B., smooth seeds); Wilde F. C. S., *Burkart* 3929, October 20, 1931 (B., immature); Carhuë, Sierras Pampeanas, *Lorentz* 320[c], April, 1881 (B., seeds smooth); Arroyo Cortapié, Sierras Pampeanas, *Lorentz* 320[b], March 19, 1881 (B., seeds smooth); Sierra Ventana, Sierras Pampeanas, *Lorentz* 320[a], February–April, 1881 (B., seeds smooth); Sierras Pampeanas, *Lorentz* 360, February April, 1881 (B., seeds smooth); Sierra Ventana, *Alboff* (La Plata, seeds smooth); Bahia Blanca, *Darwin*, early in October, 1832 (K.); Carmen de Patagones, *C. Berg* 33, November 17, 1874 (B., seeds smooth). Prov. Rio Negro: vicinity of General Roca (alt. 250–360 m.), *Walter Fischer* 65, December 29, 1914 (G., U. S., N. Y., F. M., seeds smooth); northern bank of Rio Negro, near the island Choele-Choel, *Lorentz*, May 29, 1879 (B., seeds smooth); common between Laguna de Las Bandurrias and Fortin Fé, *Lorentz*, April 24, 1879 (B., seeds smooth); Rio Negro, *Scala* 46 and 48, January, 1916 (La Plata, seeds smooth); Rio Negro, *Wilkes Exped.* 1838–42 (G., U. S., N. Y., seeds smooth). Prov. Chubut: seacoast, Port Madrin, *Bettfreund* 52 (B., seeds smooth). Patagonia: Quilbay, *Bettfreund* 1249, March, 1893 (B., seeds smooth); Patagonia, *Moreno & Tonini* 343, 1882 (N. Y.,

marked *Buda media* Dum. (L.) by Kuntze; over-ripe, no seeds).[1] PROV. SANTA CRUZ: Port Desire, *Darwin* (K., seeds smooth); 200 m., Minerales, *Donat* 197, November 14, 1929 (G., Cal. Acad., F. M., U. C., seeds smooth); Cañadon de las Vacas (Sec. xv), *Beoufals* (?) (La Plata, seeds smooth). BOLIVIA: DEPT. COCHABAMBA: 2700 m. alt. Cerritas, *Steinbach* 4007, April 16, 1920 (B., elongate inflorescence showing tendency toward *S. pazensis*, seeds smooth); 2600 m., Cochabamba, *Bro. Julio II* 262, 1932 (U. S., open inflorescence, habit showing tendency toward *S. pazensis*, seeds smooth); 3000 m., Cochabamba, *Kuntze*, March 26, 1892 (N. Y., seeds smooth, protracted inflorescence showing tendency toward *S. pazensis;* marked *Buda grandis* by Otto Kuntze);[2] common on the slopes of the hills, Cochabamba, *Parodi* 10193, February 15, 1932 (G., hubbled seeds, protracted open inflorescence similar to that of *S. pazensis*). DEPT. LARECAJA: 2600–2790 m. alt. near Sorata, *Mandon* 946, 1898 (?) (N. Y., F. M., typical of *S. ramosa*, seeds smooth);[3] 7000 ft., Sorata, *R. S. Williams* 1541, October 2, 1902 (N. Y., seeds papillose on the rim, habit typical of *S. ramosa*). Without locality: *Haenke*[4] (B., marked *Spergularia macrocarpa* Presl[5] and also *Lepigonum marinum* by Kindberg, 1861; seeds smooth and typical of *S. ramosa*).

At first it seems odd that one species should have both smooth and papillose seeds. Further study reveals a few specimens with papillae confined to the swollen rim of the seed, leaving the flat sides smooth, and a few more specimens only slightly hubbled in the same pattern as the papillae of the papillose seeds. The smooth seeds are generally a little larger, 0.7–0.9 mm. long, the majority 0.8 mm., while the papillose ones are 0.6–0.8 mm., the majority between 0.7 and 0.8 mm. But since the shape, color, and wings of both are the same and since both have similar capsules, sepals, leaves, stipules, and geographic range, the papillose-seeded trend deserves no taxonomic recognition. A few specimens in Bolivia have elongate inflorescences and habit similar to *S. pazensis*, which see for discussion.

The only St. Hilaire specimen in the Paris Museum that could be the type of *S. ramosa* has neither the handwriting of Cambessedes, nor the type locality, Montevideo. The plant has longer internodes in the inflorescence and therefore more lax habit than is usual in the

[1] Cited under *Buda marina* by Kuntze, Rev. Gen. iii. pt. ii. 13 (1898).

[2] Cited under *Buda grandis* by Kuntze, l. c. (1898).

[3] Cited under *S. villosa* var. α *genuina* Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 268, t. 61, fig. 1 (1872).

[4] Locality given in Presl, Reliq. Haenk. ii. 9 (1831), "Habitat in Peruviae montanis huanoccensibus et in Cordilleris de Chile."—which is probably incorrect because this species is not known from Chile and Haenke *did* go to Buenos Aires and Montevideo where it is common.

[5] Cited as type of *Spergularia macrocarpa* by Presl, Rel. Haenk. ii. 9 (1831).

wide-ranging species under discussion. According to the description of Cambessedes in St. Hilaire, Fl. Bras. ii. (1829), the internodes below should be 6–8 lines or ca. 12–16 mm. long, the pedicels 1–4 lines or ca. 2–8 mm. long, and the internodes above should be twice as long as those below. The plant labeled *S. ramosa* in Paris has the internodes below 25–30 mm. long, the peduncles 7.5–12.5 mm. long, and the internodes below equal to those above. It must be assumed, then, at present, that this plant is not the type but was probably identified by Cambessedes. However, the detailed description by Cambessedes coincides in all measurements and other characters with the species under discussion. It may now be asked whether the plant in the Paris Museum could belong to another species of the region. It differs from *S. levis* in having light brown, unsculptured seeds with dark brown papillae and an entire wing, glandular-pubescent inflorescence and capsule equal to the calyx. It also differs from *S. grandis* in having light brown, unsculptured seeds and 3-valved capsules nearly equal to the calyx. This plant may possibly be *S. ramosa* var. *diffusa*, because of its elongate inflorescence and small seeds which measure 0.5 mm. in length. However, the seeds are not mature and the capsule does not protrude from the calyx as is characteristic of the variety. Therefore, the sensible thing to do is to relegate the plant to *S. ramosa* for the present with the hope that future collecting will throw more light upon the subject. The name *S. ramosa* is, therefore, retained on the strength of Cambessedes' good description.

36. Var. **diffusa**, var. nov. (TAB. 595, FIG. 1e–1g). Perennis: radice centrali farinacea cortice leve suberea, interdum 1 cm. crassa: caulibus 2–6, erectis, 15–35 cm. longis, interdum ramosis infra; internodiis caulis partis efloriferi glabris vel villoso-glandulosis, vulgo longis gracilibusque, 10–42 mm., vulgo 15–25 mm. longis, 0.6–1.5 mm., vulgo 0.8–1.2 mm. crassis; foliis fasciculatis, filiformibus, mucronatis, 15–50 mm. longis, 0.6–1.2 mm. latis, vulgo villoso-glandulosis interdum glabris, saepe late patentibus pseudoverticillatis; stipulis triangularibus acuminatis, vulgo tam longis quam latis, 1.2–5 mm., vulgo 1.2–3 mm. longis: floribus in cymam patentem dispositis semper villoso-glandulosis; internodiis 10–30 mm., vulgo 13–20 mm. longis, 0.4–1 mm. latis; bracteis minimis, 1–3 mm. longis: sepalis ovatis, abrupte acutis, villoso-glandulosis, 3.2–5 mm. longis: petalis albis ovatis, 2.5–4 mm. longis, vulgo sepalis 0.5–1.2 mm. brevioribus; staminibus 6–9; stylis 3, ad basim divisis, 0.7–0.8 mm. longis: capsulis maturis 5–8 mm. longis, sepalis 1/3 (2–3.8 mm.) longioribus: pedicellis fructiferis haud reflexis, infimis 5–20 mm. vulgo 10–15 mm. longis: seminibus vulgo papillatis interdum levibus, 0.6–0.8 mm., vulgo 0.6–0.7 mm.

longis, caetera eis varietatis typicae similibus.—Usually not separated as a variety and identified under the incorrect epithet *grandis*, as in the following: *Tissa grandis* sensu Morong & Britt. in Ann. N. Y. Acad. Sci. vii (Enum. Pl. Paraguay) 53 (1892), in part, including *Morong* 921 and excluding Buenos Aires 3 which is *S. villosa*, non *Spergula grandis* Pers. (1805); sensu Chod. & Hassl. in Bull. Herb. Boiss. sér. 2. iii. (Pl. Hassl. ii. 171, reprint) (1903), at least in part, *i. e. Hassler* 1188 (the other coll. cited not seen), non *Spergula grandis* Pers. (1805).—South America: In Paraguay and in the northern interior of Argentina. Paraguay: Gran Chaco, *Andrew Pride*, (K., seeds papillose); near Assomption in the prairies in impermeable clay soil, *Balansa* 2272, September 25, 1875 (K., seeds papillose); Loma Clavel, lat. S. 23° 20′, Gran Chaco, *Rojas* 2475, November, 1903 (G., F. M., seeds papillose); in fields, Tacural, *Hassler* 1188 (N. Y., immature); Pilcomayo River, *Morong* 921 (1888–1890) (G., U. S., N. Y., F. M., seeds papillose). Argentina: Prov. Formosa: Formosa, *Jörgensen* 3202, August, 1919 (G., U. S., seeds papillose). Prov. Jujuy: in saline soil, Piquete (?), *R. E. Fries* 486, 1901 (U. S., over-ripe, no seeds); on saline, sandy banks of Laguna de la Bier, *R. E. Fries* 110, 1901 (U. S., seeds papillose). Prov. Tucumán: calcareous ground, Cerro del Campo, Dept. Burruyacu, *Venturi* 7722, December 16, 1928 (G. type, U. S., seeds papillose); border saline lakes, Chanar Pojo, Dept. Leales, *Venturi* 466, September 18, 1919 (U. S., immature). Prov. Entre Rios: Concepcion del Uruguay, *Niederlein*, May 11, 1880 (B., over-ripe, no seeds). Prov. Santa Fé: Colonia Humboldt, Dist. Colonias, *E. Hunyiker* 40, October 6, 1875 (B., seeds papillose but immature); Chaco Santafecino, Lanteri (F. C. S. F.), *Burkart* 5750, November 10, 1933 (B., seeds papillose). Prov. Cordoba: Gusapampa, Dept. Minas, *Hieronymus*, March 17, 1877 (B., seeds smooth); Troncho-payo around Carroya, *Galander* 35, November 27, 1880 (B., seeds not mature); Cordoba, *Kurtz* (N. Y., immature); Cordoba, *Kuntze*, December, 1891 (N. Y., La Plata, seeds papillose); Rio Zeballos, Sierra Chica, *Galander*, February 14, 1878 (B., seeds papillose). Prov. La Rioja: Nonogasta, Dept. Chilecito, *Venturi* 7791 December 28, 1928 (G., U. S., seeds smooth). Map 30.

Var. *diffusa* differs from the typical variety of the species in having longer internodes, more fleshy tap-root, usually smaller stipules, shorter sepals, shorter styles, more protruding capsule, and usually smaller seeds. It is the same as the typical variety in number of stamens, length of pedicels, and type of seeds and wing.

37. S. levis Camb. (Plate 596, figs. 2a–2c, map 31). *Perennial, entirely glabrous*, with a tap-root: *caudex* bearing from 2–6 stems, erect or nearly so, 20–40 cm. long; *internodes of stem below the inflorescence* glabrous, 28–50 mm. long, 1.2–3 mm., usually 1.2–2 mm., thick: *leaves not fascicled*, or sometimes 1–2 leaves at the axil, linear-filiform,

usually blunt at the apex, 22–80 mm., usually 30–45 mm. long, the very long ones occurring only toward the base, 0.8–1.6 mm., usually 1–1.4 mm. wide, always glabrous; *stipules* very broadly lanceolate-acuminate, 3.5–7 mm., usually 4.5–6 mm. long: *inflorescence* a strict cyme, *always glabrous throughout*, with the internodes shorter than those below, the lower 5–30 mm., usually 10–25 mm. long, 0.4–0.7 mm. wide; *bracts* filiform, wanting or as much as 8 mm. long: *sepals* ovate, abruptly acute, broadly scarious-margined, glabrous, 2.8–6.8 mm. long; *petals* ovate, white, 2 mm. long; *stamens* 7–10; *styles* 3, separated to base, 0.3–0.6 mm. long: *mature capsules greatly exceeding the calyx*, 5–8.4 mm., usually 6–8 mm. long, 1.6–3.4 mm., usually 2–3 mm. longer than the calyx: *fruiting pedicels* filiform, glabrous, never reflexed, the lower 7–20 mm. long: *seeds* 0.6 mm. long, *deep reddish-brown, often glistening, pyriform, surface covered with closely interwoven, deep, vermiform sculpture, with reddish, glandular papillae scattered at regular intervals over the whole surface, always surrounded by a scarious, white, erose wing*, 0.2–0.4, usually between 0.2 and 0.3 mm. wide.—Camb. in St. Hilaire, Fl. Bras. ii. 176 (1829); G. Don, Gen. Hist. Diehl. Pl. i. 426 (1831); Kindb. Synop. 16 (1856), among the species excluded from *Lepigonum;* Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 270, fig. 62 (1872), in part (including the following parts of the description: 3-merous element, glabrous calyx and erose wing of seed, including also the figure, except for the capsules with five valves and collections, Rocha, *St. Hilaire*, and Rio de Janeiro, *Sello;* excluding at least part of the Montevideo, Brasil, *Sello* coll., which is *S. grandis*, *q. v.*); Arech. in Anal. Mus. Nac. Montevideo, vi. iii. (Fl. Uruguay i.) 94 (1901). *Arenaria bonariensis* Gill. in Hook. & Arn. Misc. Bot. iii. 148 (1832); Steud. Nom. Bot. ed. 2, i. 123 (1840), in part, excluding reference, *Spergularia rupestris* Camb. *Spergula laevis* (Camb.) D. Dietr. Syn. Pl. ii. 1599 (1840); Steud. Nom. ed. 2. ii. 617 (1841). *Lepigonum laeve* (Camb.) Kindb. Mon. Lepig. 32, t. ii, fig. 18 (1863). *Buda grandis* sensu Kuntze, Rev. Gen. iii. pt. ii. 13 (1898), in part (including citations, Sierra de Solis, Uruguay, and Buenos Aires, *Hauthal* 661; excluding the remainder of citations which belong with *S. ramosa*, *q. v.*), non *Spergula grandis* Pers. (1805). *Spergularia bonariensis* (Gill.) Hicken, Chloris Plat. Argent. 104 (1910), as to source of name, but only in part as to plants, including only the reference *S. laevis* Camb. (specimens cited have not been seen by the author).—South America: Southern Brazil and common in Uruguay and in the Argentine about Buenos Aires. Brazil: Ad ripas S. João, *Sello*, November 23[1] (B., marked *Lepigonum laeve* (Cambess.) by Kindberg 1861); no locality, *St. Hilaire* 2039 (Paris, probably type, photo. in Gray,[2] immature, and B., marked *Lepigonum laeve* by Kind-

[1] According to Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 270 (1872), the locality for this is "ad ripas fluminis S. João, Rio de Janeiro." Cited by Kindberg under *Lepigonum laeve*, Mon. Lepig. 32 (1863).

[2] One label has *Spergularia levis* + probably in Cambessedes' handwriting. The other was written by Spach. This specimen may not be the type because it does not

berg, 1861, immature).[1] URUGUAY: Sierra de Solis,[2] *Kuntze*, November, 1892 (B., N. Y., both marked *Buda grandis* (Pers.) Camb. by Kuntze;[3] littoral, Playa Ramirez, *Hugh M. Smith* 139, October 29, 1922 (U. S., has one 4-valved capsule); Barra del Sta. Lucia, Dept. San José, *Herter* 159[d], November, 1927 (N. Y.); Montevideo, *Sello*, October 22 (B.); in the fields, Montevideo, *Gibert* 751, October, 1867 (K.), October, 1858, Montevideo (K.); alt. 0–10 m., Pocitos-Malvin, Dept. Montevideo, *Herter* 76260, November 23, 1924 (B.); Montevideo, *Gibert* 168 (K.). ARGENTINA: PROV. ENTRE RIOS: im trocknen, steinigen Camp vor d. Lagune, Concepcion del Uruguay, *Lorentz*, October, 1875 (B.); Concepcion del Uruguay, *Lorentz* sub 282, October, 1875 (B.); Concepcion del Uruguay, *Niederlein* 15, May 7, 1880 (B.). PROV. BUENOS AIRES: Delta del Paraná, Corabelas, *Burkart* 4462, February 16, 1932 (B.); sandy brackish flats near the Paraná,[4] Campana F. C. C. A., *Burkart* 5667, November 5, 1933 (B.); Saavedra, *Bettfreund* 1022, 1896 (B., only part of the plants on the sheet); in abundance in la Baca Palermo, Barracas, etc. around Buenos Aires, *C. Berg* 220, October, 1875 (B.); Buenos Aires, *Hauthal* 661, 1891 (N. Y., from Herb. Otto Kuntze and marked *Buda grandis* presumably by him);[5] plains of Buenos Aires, *Gillies* (K., photo. in G., type of *Arenaria bonariensis* Hook. & Arnott); Buenos Aires 5, *Gillies* (K.);[6] Buenos Aires 188 and 188a, *Bettfreund* (B.); Punta Lara, *Alboff* 1895 (La Plata); rich meadows between La Plata and Ensenada, *Cabrera* 1774, October 9, 1931 (U. S., F. M., immature); La Plata, *E. L. Ekman* 1875, October 20, 1907 (N. Y.). TERR. SANTA CRUZ: 200 m. alt., Minerales, *Donat*, 198, October 16, 1929 (G., N. Y., F. M., Cal. Acad., U. C.,[7] nearly mature (N. Y. is mature) but with unusually short stems).

This species is distinguished from others of similar habit of the same region by its entirely glabrous quality (hence the name *levis*) and the strongly erose margin of the seed. It is further distinguished from *S. ramosa* by its darker, sculptured seeds, strongly protruding capsules, shorter styles, and longer internodes throughout the whole plant. It is further separated from *S. grandis* by its three-valved capsules and three shorter styles.

(To be continued)

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have the definite type-locality, Rocha, Uruguay. Photo. and data by courtesy of Mr. C. A. Weatherby.

[1] Cited under *Lepigonum laeve* by Kindb. Mon. Lepig. 32 (1863).

[2] At the junction of Minas, Canelones and Maldonado Prov.

[3] Cited under *Buda grandis* by Kuntze, Rev. Gen. iii. pt. ii. 13 (1898).

[4] On such, low, flat, barren ground all the species of *Spergularia* of the region seem to assemble.

[5] Cited under *Buda grandis* by Kuntze, Rev. Gen. iii. pt. ii. 13 (1898).

[6] Hooker, Bot. Misc. iii. 148 (1832) says, "Ditches near Buenos Aires—*Dr. Gillies*." Neither the sheet with "n. sp. Gillies" on the label nor the one marked "B. A. 5 *Gillies*" have this actual data recorded upon them, though they are both mounted on Herb. Hook. sheets under *Arenaria bonariensis* Gill.

[7] Possibly introduced from Buenos Aires and Montevideo?

DISSEMINATION BY ANTS OF THE SEEDS OF TRILLIUM GRANDIFLORUM

Burton N. Gates

The fruit of *Trillium* is three-celled, subglobose, varying around one-half inch in long diameter and contains numerous seeds. When ripe, separating at the calyx, the fruit falls to the ground without opening, but seeds are exposed at the base of the capsule where it is detached. The seeds are relatively large, easily seen, and change in color, on exposure to the air, from a whitish or light brown to a darker, reddish brown. On removal from the fruit, the ovate seeds appear to be coated with a viscous or gelatinous substance, which will dry. Moisture apparently revives this viscosity. (The viscous or gelatinous quality suggests that there may be an adaptation for seed-dispersal by means of adhesion to animals.) At the hilum is a spongy caruncle, roughly one-fourth the bulk of the seed. Similar fleshy material forms the axis of the fruit. The capsule when quite empty is thin and papery. Apparently, the plant has no mechanical means of scattering its seeds.

For experimentation on the germination of seeds of *T. grandiflorum* Salisb. we had received a request for all of the fresh seeds which could be procured from our plants. The first fruits ripened, falling readily into the hand, on July 13, 1939 (Worcester, Mass.), four fruits being collected that evening. The next morning a number of fruits had ripened and had fallen to the ground. Surprisingly, on examination not one of these had a seed remaining in it; after a prolonged search, not a seed could be found on the ground. Examination of empty capsules revealed that they had been thoroughly cleaned out, leaving only the thin, papery shell. It was far from apparent how these viscous seeds could have completely disappeared from the capsules and the ground in such a short time. There had been no rain. The next day more ripened fruits were collected; more emptied capsules were seen beneath the plants, all quite devoid of seeds. It was recalled then, that on the previous day, two empty capsules each contained a black ant. Instantly, a relationship between ants and the disappearance of the seeds was suspected.

A test was made. A freshly harvested fruit was offered to a black ant (species undetermined) crawling on the ground. With apparent familiarity, she at once mounted the fruit, at the freshly-exposed end. Within a few seconds she dug out a seed, adjusted it in her mandibles,

and started off. She was traced. Presently, she disappeared among a heap of small garden-stones (about a half-pailful). Simultaneously, numerous Trillium seeds were observed scattered about the base of the stone pile. A second ant found under the Trillium plants, was offered a freshly picked fruit, but before it could be placed on the ground, she reared, and turned toward the fruit, exhibiting a positive interest in it. She, like the other ant, extracted a seed and carried it off in the direction of the stone heap, about twelve to fifteen feet from the Trillium plants.

Seeds scattered about the base of the stones were gathered with forceps. Then, one-by-one, the stones were carefully removed, thus exposing many more seeds, seemingly dropped between stones and not in the small galleries beneath stones. Quite conclusively, the seeds had been discarded by the ants. No seed was found more than eighteen inches from the stone pile. In all seventy seeds were recovered.[1]

As more stones were removed, the entire colony was found to have concentrated beneath a larger stone, about the size of a hand. In the midst of this confusion, two ants were seen, each carrying a fresh Trillium seed with the caruncle. Doubtless these were the seeds offered but a few minutes before in the tests. The ant colony was estimated at around five hundred individuals. No larvae or pupae were seen. There was no apparent gallery or tunnel below the surface of the ground. All galleries or chambers were found beneath the small stones. At first regarded as a temporary nest, in reality this was probably a permanent one.

There was no indication that the ants used the seeds in any manner comparable to the ways of the harvester-ants; not one seed was found eaten, nor was there the slightest evidence of storing. On the contrary, the seeds were quite definitely scattered and discarded around the nest. The caruncle (and possibly the gelatinous coating) appeared to have been eaten off consistently. Fleshy material, in appearance like the caruncle, occurs in the capsule, which the ants clean out apparently for food. There is evidence that the fruits may be eaten into, before they fall from the plants; a number were observed gnawed at the point of attachment, but whether a seed had been removed, could not be positively determined. Black ants were seen exploring all over the plants, particularly after the last fruit had been harvested.

[1] Sir John Lubbock (1894) is quoted as having seen ants carry seeds to their nests, but it is not clear what seeds or for what purpose.

There is no doubt of the appeal of the caruncle to the ants; it attracts them no less than nectar attracts bees. Quoting William Morton Wheeler (Ants . . . 1910. p. 315), "Surnander (1903) and other botanists believe that ants eat the caruncles." The present study seems to confirm that hypothesis, especially so, since there had been no rain between the first ripening of the capsules and the final observations.

Bloodroot seeds, *Sanguinaria canadensis* L., have caruncles. These observations on Trillium seeds are paralleled by those of Dr. E. B. Southwick as told by Dr. Wheeler (ibid). Dr. Southwick observed ants carrying off bloodroot seeds and feeding on the caruncles. In the writer's garden this may account for the recent appearance of a bloodroot seedling, some twenty feet upgrade from the nearest group of bloodroot plants.

These two New England natives, *Trillium grandiflorum* and *Sanguinaria canadensis*, lack mechanical means of seed-dispersal. Each have ample caruncles, seemingly of food value to ants, which, serving as lures, suggests that seed-dispersal is accomplished through the agency of ants. Seeds discarded in the debris of ant nests should find a favorable medium for germination.

Worcester, Massachusetts.

Cyperus microiria on Long Island.—A specimen collected at Hempstead, Long Island, by E. P. Bicknell in 1906 and first recorded in the 2nd edition of Britton & Brown's Illustrated Flora I, 301 (1913) as *Cyperus Iria* L., was referred to *C. amuricus* Maxim. by Prof. Fernald and Mr. Griscom in Rhodora XXXVII, 148 (1935). There are, however, two closely allied species in Eastern Asia which are distinguished from *C. Iria* in having distinctly mucronate scales, i. e. *C. amuricus* Maxim. and *C. microiria* Steud. The difference between the two plants was clearly pointed out in Bot. Mag. Tokyo XLVII, 236–239 (1933) by Prof. Nakai who carefully examined authentic specimens of related species during his trip in Europe. A specimen from Long Island well agrees with Japanese specimens of *C. microiria* and is not the true *C. amuricus* of which I have also examined the isotype specimen in the Gray Herbarium. *C. microiria* differs from *C. amuricus* by having shortly mucronate scales which are generally more yellowish and more compound inflorescences, and is an inter-

mediate species between *C. amuricus* and *C. Iria*. It is a native of Japan proper, Korea, Manchuria and China, and *C. Iria* var. *acutiglumis* Fiori from Italy is also identical with that species. According to Prof. Nakai, *C. amuricus* var. *japonicus* Miquel is a form of the true *C. amuricus* with shorter spikelets. The synonymy of *C. microiria* is summarized as follows:

Cyperus microiria Steudel, Syn. Pl. Glum. II, 23 (1855). Syn. *Cyperus Textori* Miquel in Ann. Mus. Bot. Lugd.-Bat. II. 141 (1865). *C. Iria* β. *microiria* (Steudel) Franch. et Sav., Enum. Pl. Jap. II. 103 (1876). *C. Iria* var. Hance ex C. B. Clarke in Journ. Linn. Soc. XXI, 138 (1884). *C. japonicus* Makino in Bot. Mag. Tokyo XVIII, 53 (1904) excl. syn. Miq.; non *C. japonicus* Miq. 1865. *Chlorocyperus Franchetii* Palla in Österr. Bot. Zeitschr. LIX, 193, t. 3, f. 6 (1909). *Cyperus Iria* var. *acutiglumis* Fiori, Fl. Ital. Exsicc. ser. 2, no. 1231 (1910). *C. Iria* var. *microiria* (Steudel) E. G. Camus in Fl. Gén. Indo-Chin. VII, 59 (1912) quoad syn. *C. amuricus* var. *subirioides* Kükenthal in Fedde, Rep. XXVII, 107 (1929). *C. Iria* var. *microiria* (Steudel) Koidzumi, Fl. Symb. Or.-Asia. 37 (1930). *C. amuricus* var. *Textori* (Miq.) Kükenthal in Sinensia III, 80 (1932). *C. amuricus* var. *japonicus* (non Miquel) sensu Kükenthal in Engler, Pfl.-reich IV[20], Lief. 1, 153 (1935) excl. syn. nonnull.—Hiroshi Hara, Gray Herbarium.

Aster Kumlieni: a Correction.—Apparently the first use of the name *Aster Kumlieni* in print is by Gray in 1886 in Synoptical Flora I[2]: 179, where, under the citation "*A. Kumleini*, Fries, in distrib. Mus. Ups. no. 5," it appears as a synonym of *A. oblongifolius* Nutt., var. *rigidulus* A. Gray. The same treatment is accorded *Aster Kumlieni* by Nelson in New Manual of Rocky Mountain Botany, and by Robinson and Fernald in the 7th ed. of Gray's Manual. The name itself appears not to have been validly published until 1906, in Rydberg's Flora of Colorado. Rydberg also treated it as a good species in his later Flora of the Rocky Mountains and Flora of the Prairies and Plains, separating it from *A. oblongifolius* as a lower, more western plant, with more rigid, slightly broader and rougher leaves, and a distinctly fastigiate habit. In Britton & Brown's Illustrated Flora it is treated as a synonym of *A. oblongifolius*. It is noteworthy that, in all these works, the uniform spelling *A. Kumleini* appears.

Mr. Ray M. Koon, Head of the Cedar Hill Field Station of Massachusetts State College, Waltham, Mass., has prepared for the new edition of *Standardized Plant Names* what is perhaps the first complete checklist of *Aster* species thus far compiled. In writing Mr. Koon,

December 5, 1939, about his list, I asked this question: "Is *Aster kumleini* correct? I have sometimes wondered if the eponym of this aster might not be Thure Kumlien, Wisconsin's distinguished early naturalist and botanist, about whom the late Dr. E. L. Greene wrote his charming sketch in Pittonia I: 250–260. 1889." Mr. Koon turned my inquiry over to Mr. Weatherby of the Gray Herbarium, from whom he obtained, under date of December 9, this informing reply:

Mr. Dayton is apparently correct. The name *Aster Kumleini* was taken up by Gray from Fries who, so far as I know, merely used it on the labels of specimens distributed, but never otherwise published it. We have an isotype here with a copied label in Dr. Gray's hand which reads as follows:

"Th. Kumlien. Plant. Viscons. Exs. No. 5. Aster (apparently Kumleini written over to Kumlieni. Directly under this is written) Aster Kumlieni E. Fries. Albion, Dane Co. Distrib. e. Mus. Upsal."

"Viscons." is, of course, Scandinavian phonetics for Wisconsin. From the rewriting and doubling of the name it is reasonably certain that Dr. Gray himself made the correction proposed by Mr. Dayton; so far as I know, he did not publish it.

Mr. Weatherby also suggested that it would be well to put the matter on record. This note is in answer to the generous invitation of Messrs. Weatherby and Koon. It now appears overwhelmingly evident that the proper spelling of this name is *Kumlieni*.—William A. Dayton, U. S. Forest Service, Washington.

Gentiana **Pennelliana**, nom. nov. *Diploma tenuifolia* Raf. Fl. Tell. iii. 27 (1837). *Dasystephana tenuifolia* (Raf.) Pennell in Bull. Torr. Bot. Cl. xlvi. 183 (1919). *G. tenuifolia* (Raf.) Fernald in Rhodora, xli. 557 (1939), not Petrie in Trans. N. Z. Inst. xlv. 270 (1913).

I am indebted to Miss Marjorie Stone for directing my attention to Petrie's New Zealand species of 1913. For the beautiful white-flowered Florida representative of the more northern blue-flowered *Gentiana Stoneana* Fernald, l. c. 555, t. 579 (1939) I am glad to propose the name *G. Pennelliana,* in recognition of Dr. Francis W. Pennell who in 1919 clearly established the specific distinctness of the two.—M. L. Fernald.

Arthraxon hispidus var. cryptatherus in New York.—The establishment of *Arthraxon hispidus* var. *cryptatherus* (Hack.) Honda in Virginia is sustained by recent collections in Elizabeth City Co., Rhodora, Vol. 38, page 395, 1936, Sussex Co., Rhodora, Vol. 41,

page 529, 1939. In the herbarium of the New York Botanical Garden are *Hermann* 9923, collected in Arlington Co., Va. (1938) and *Monachino* 404, Rock Creek Park, Washington, D. C. (1937).

But the station north of the District of Columbia, reported by Hitchcock's Manual of the Grasses of the United States, p. 725, has been questioned by Fernald, RHODORA, Vol. 38, p. 395 (1936) and its standing clarified by Chase in the same publication, Vol. 39, p. 100. This record (from Pennsylvania), according to Chase, is founded on the examination of a specimen at the U. S. National Herbarium collected by *F. L. Scribner* on ship's ballast, Philadelphia, in 1878.

Has the Philadelphia station of over 60 years ago been destroyed? Regardless, this grass might easily flourish in Pennsylvania, as I have observed it for the last four years as a vigorous weed in the grounds of the New York Botanical Garden, Bronx, New York (No. 397, collected Oct. 6, 1937).—JOSEPH MONACHINO, New York Botanical Garden.

VIOLA CUCULLATA IN MISSOURI

JULIAN A. STEYERMARK

WHEN material of *Viola* was examined in connection with the preparation of Palmer & Steyermark's Annotated Catalogue of the Flowering Plants of Missouri, it was found that a large number of specimens, which were in reality *Viola papilionacea*, had been misidentified as *Viola cucullata*. In fact, no authentic material of *Viola cucullata* from Missouri had ever turned up.

This confusion between *Viola papilionacea* and *Viola cucullata* was largely due to the perpetration of the latter name in early check-lists of and works on Missouri plants, notably by Daniels,[1] Eggert,[2] Engelmann Botanical Club,[3] and Tracy,[4] and by the continued application of the name in various articles written in earlier journals and scientific periodicals in connection with the vegetation of the state. The best diagnostic characters separating these two species are brought out by Brainerd in Robinson and Fernald's 7th edition of Gray's New

[1] Daniels, F. Flora of Columbia, Missouri, and Vicinity. Univ. Mo. Stud. Sci. Ser. 1: 179. 1907.

[2] Eggert, H. Catalogue of the Phaenogamous and Vascular Cryptogamous Plants in the Vicinity of St. Louis, Missouri. 1891.

[3] Engelmann Botanical Club. Preliminary Check-list of the Cryptogams and Phanerogams in the Vicinity of St. Louis, Missouri. 1911.

[4] Tracy, S. M. Catalogue of the Phaenogamous and Vascular Cryptogamous Plants of Missouri. Jefferson City, 1886.

Manual of Botany, wherein, "Beard of lateral petals strongly knobbed; cleistogamous flowers long and slender" for *V. cucullata* is contrasted with "Beard of lateral petals not strongly knobbed; cleistogamous flowers ovoid or ovoid-acuminate" for *V. papilionacea* and related species. The character of the knobbed or unknobbed beard of the lateral petals is particularly obvious, and if specimens had been carefully examined for this point by collectors, many misidentifications could have been avoided. On this basis it was found that all Missouri material at one time identified or recorded as *V. cucullata* proved on examination to be *V. papilionacea.*

In the spring of 1938, the author was collecting in some swampy meadows in the southeastern Ozarks, and chanced upon a stemless blue violet which had all the characteristics of *Viola cucullata.* The peduncles exceeded the leaves and the beard on the lateral petals appeared strongly knobbed. Moreover, the plants were growing in a swampy meadow, a habitat shared by a number of rare and isolated species of more northern and eastern range, which in this portion of the Ozarks, and in such habitats, are at their southern and southwestern limits of dispersal. Species of just such rarity which were associated with the violet in this or in other similar meadows in the southeastern Ozarks, were *Menyanthes trifoliata* var. *minor, Liparis Loeselii, Aster puniceus* var. *lucidulus, Galium tinctorium* (*G. Claytoni* of authors), and *Cirsium muticum.* Further examination of the violet showed without doubt that it was *Viola cucullata,* and the identification has been verified by Dr. M. L. Fernald. The collection is from a marshy meadow in valley of North Prong of Bee Fork, T32N, R2W, Sect. 23, 5 miles east of Bunker, Reynolds County, May 26, 1938, *J. A. Steyermark 5488.* Specimens have been deposited in the Gray Herbarium and in the Herbarium of Field Museum.

The range of *Viola cucullata* may now be extended southwestward to include southeastern Missouri, and it is expected that future exploration may reveal its occurrence in other swampy meadows of the southeastern Ozarks. *Viola papilionacea,* on the other hand, common throughout Missouri, is found in a variety of habitats, most commonly in alluvial or open woods, along streams, waste ground, and even crevices of bluffs.

Field Museum of Natural History
Chicago, Illinois.

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RAPISTRUM IN NORTHERN NORTH AMERICA

Robert T. Clausen

While botanizing with Harold Trapido on the gravelly shore of Métis Bay, Matane County, Quebec, on August 24, 1937, I collected an unfamiliar crucifer. Search in Gray's *Manual* and in Marie-Victorin's *Flore Laurentienne* failed to reveal the identity of the plant. Only after considerable investigation did I finally recognize it as a member of the Old World genus, *Rapistrum*, characterized by the indehiscent, two-jointed siliques. The plant was *R. rugosum* (L.) Allioni. This species was reported by Britton and Brown (1897) and by Porter (1903) from Northampton County, Pennsylvania, and from ballast about seaports; by Knowlton and Deane (1916) from the Boston District; by House (1924) as an occasional ballast plant about New York City and on Staten Island; and by Groh (1933) from Montreal.

To determine the present status of *Rapistrum* as a weed in the northern United States and Canada, I secured all the information available from specimens in several eastern American herbaria. In this study, I am indebted for the loan of specimens and for reports on collections to the authorities at the Gray Herbarium (GH), the Missouri Botanical Garden, the New England Botanical Club (NEBC), the University of North Carolina, the New York Botanical Garden (NY), the Academy of Natural Sciences at Philadelphia, the United States National Herbarium (US), and Cornell University (CU); also to Dr. Herbert Groh, Botanist at the Central Experimental Farm, Ottawa. Review of the available evidence indicates that three

species of *Rapistrum* have been collected as weeds in North America and that the genus has been found in six states and two Canadian provinces.

In his monograph of the genus, O. E. Schulz (1919) recognized three species. I have followed him in maintaining the three species, but am doubtful concerning the specific distinctness of *R. hispanicum* and do not consider the variations of *R. rugosum* worthy of nomenclatorial recognition. The following key, showing some of the characters by which the species are separated, is adapted from Schulz.

A. Lower joint of the silique stout, scarcely more slender than the upper; beak conical, short, 0.5–1 mm. long............1. *R. perenne*

AA. Lower joint of the silique much more slender than the upper; beak filiform, elongate, 1–5 mm. long........................B

- B. Fruiting pedicels 1–6 mm. long, enlarged upwards, 0.75–1.5 mm. thick, suberect............................2. *R. rugosum*
- BB. Fruiting pedicels 6 mm. long or more, slender, not enlarged upwards, 0.5 mm. thick, more or less recurved .3. *R. hispanicum*

1. Rapistrum perenne (L.) Allioni. This has been reported by Groh (1933) as securely established as a field weed in the region of Grenfell, Saskatchewan. Groh has discussed the characteristics of this species and methods of control.

2. Rapistrum rugosum (L.) Allioni. Weed in waste places and on ballast. Quebec: Métis, Matane Co., *R. T. Clausen* & *H. Trapido, 3127* (CU); also reported from Montreal by Groh (1933). Massachusetts: Boston, *C. E. Faxon* (GH); Charlestown, Suffolk Co., *C. E. Perkins* (NEBC). New York: New York, *A. Brown* (GH). New Jersey: Jersey City, *A. Brown* (NY). Pennsylvania: Easton, *T. C. Porter* (GH). California: San Francisco, *M. A. King* (US1434864). Oregon: Linnton, Multnomah Co., *W. N. Suksdorf 1703* (GH).

3. Rapistrum hispanicum (L.) Crantz. Ballast plant. Oregon: Linnton, Multnomah Co., *W. N. Suksdorf 1920* (GH).

Bailey Hortorium,
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House, H. D. 1924. *Rapistrum*, in Annotated list of the ferns and flowering plants of New York. N. Y. State Mus. Bull. 254. p. 357.

Knowlton, C. H. and Deane, Walter. 1916. *Rapistrum*, in Flora of the Boston District. Rhodora **18**: 220.

Porter, T. C. 1903. *Rapistrum*, in Flora of Pennsylvania. p. 152.

Schulz, O. E. 1919. *Rapistrum*, in Das Pflanzenreich 4. 105. p. 252–261. fig. 32.

SPERGULARIA IN NORTH AND SOUTH AMERICA

Ruth P. Rossbach

(*Continued from page 193*)

38. S. grandis (Pers.) Camb. (Plate 596, figs. 1a–1c and map 32). Perennial with a heavy tap root: *caudex* bearing 2 or more nearly erect stems, 25–40 or more cm. long; *internodes of stem below the inflorescence usually very long* (10–84 mm.), 2–2.5 mm. in diameter, glabrous or sometimes with sparse glandular pubescence above: *leaves fascicled*, mucronate, usually glabrous, 25–60 mm. long, 1–2 mm. wide; *stipules* broadly lance-acuminate, 3-5.5 mm. long: *inflorescence* an open cyme with large flowers, glandular-pubescent throughout; the *internodes* 7–50, usually 20–30 mm. long; *bracts* minute, 1.5–3 mm. long: *sepals* broadly linear, *glandular-pubescent*, 5 mm. long; *petals* ovate, white, 3–4 mm. long; *stamens* 8; *styles* 4–5, 0.8–1 mm. long, separated to the base: *mature capsules 4–5-valved*,[1] 7–8 mm. long, exceeding the calyx by 2–3 mm.: *fruiting pedicels* not reflexed, the lower 7–20 mm. long: *seeds dark brown, nearly black, shining, rounded in outline, rigid-papillose or not, surface sculptured in crowded interwoven vermiform pattern*, 0.6–0.8 mm. long, *surrounded by a brown-tinged wing with entire margin*, 0.4–0.6 mm. wide.—In St. Hilaire, Fl. Bras. ii. 177 (1829); G. Don, Gen. Hist. Dichl. Pl. i. 426 (1831), in part, including synonym *Spergula grandis* Pers. and excluding *Arenaria grandis* HBK.; Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 271 (1872), in part (including the 5-merous element of the description and the two synonyms *Spergula grandis* Pers., "forma pentagyna," and *Spergularia grandis* (Pers.) Camb.; but excluding the synonyms *Arenaria grandis* HBK., and DC. "forma trigyna," *Spergularia macrocarpa* Presl and *Lepigonum grande* (Pers.) Kindb., all three of which are *S. ramosa;* also excluding *L. arenarium* Kindb. which is a mixture of *S. ramosa* and *S. villosa*); Rohrb. in Linnaea xxxvii. 236 (1871–73) in part, for the same reasons as above; Arech. in Anal. Mus. Nac. Montevideo, iii. (Fl. Uruguay) i. 95 (1901); Macbride, Field Mus. Pub. Bot. xiii.—Fl. Peru, pt. 2. no. 2, 631 (1937), as to source of name but not as to plants discussed.[2] *Spergula grandis* Pers. Syn. i. 522 (1805); Poiret, Enc. vii. 305 (1806); D. Dietr. Syn. Pl. ii. 1598 (1840). *Arenaria grandis* (Pers.) HBK. Nov. Gen. and Sp. vi. 24 (1823), as to source of name, not as to plants discussed which are *S. ramosa*, "Vidi in A. grandi stamina 10 et stylos tres;" *Arenaria grandis* DC. Prod. i. 401 (1824), in part, including references Pers. and Poir., excluding HBK.; Steud. Nom. Bot. ed. 2, i. 124 (1840), in part, including references Pers., and excluding HBK. and Presl; Gay, Fl. Chile, i. 267 (1845), as to source of name in part (*i. e.* DC.; see above under *Arenaria grandis*), not as

[1] In one case (see citations), a collection having otherwise the characteristics of *S. grandis* has 3 valves to the capsule.

[2] *S. grandis* does not grow in Peru—the Haenke specimen cited is *S. ramosa* l. c. and "Ruiz and Pavon, without locality," has not been seen by the author.

to plant described (*S. macrocarpa* Presl is true *S. ramosa*). *Lepigonum grande* (Pers.) Kindb. Syn. Lepig. 15 (1856), as to source of name, but not as to the reference *S. macrocarpa* Presl which pertains to *S. ramosa*.[1] *Spergularia levis* sensu Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 270, fig. 62 (1872), in part (because, according to description, the plant may have pubescent calyces, 5-valved capsules (see fig.), or entire winged seeds (all of which characterize *S. grandis*) and because a *Sello* collection from Brazil with no definite locality cited and marked *S. levis* by Rohrbach is *S. grandis*), non Camb. (1829). *Spergularia platycaulis* Bartl. ex Rohrb. in Mart. Fl. Bras. xiv. ii. 271 (1872), manuscript name given as a synonym of *S. grandis* (Pers.) Camb.; Bartl. ex Rohrb. Linn. xxxvii. 237 (1871–73), same as above. *Tissa grandis* (Pers.) Morong & Britt. in Ann. N. Y. Acad. Sci. vii. (Enum. Pl. Coll. Morong in Paraguay), 53 (1892), as to source of name, not as to plants discussed (citations Morong 921 = *S. ramosa* var. *diffusa* and Buenos Aires 3 = *S. villosa*); Meigen in Bot. Jahrb. xvii. 235 (1893), as to source of name but not as to plant discussed[2] which grows in Chile; Chod. & Hassl. in Bull. Herb. Boissier, ser. 2, iii. (Pl. Hassl. ii.) 171 (renumb.) 1903, as to source of name but at least in part not as to plants cited (Hassler 1188 = *S. ramosa* var. *diffusa;* Campo Cerrito n. 924a not seen). *Buda grandis* (Pers.) Kuntze, Rev. Gen. iii. pt. 2, 13 (1898), as to source of name but not as to plants discussed (citations Buenos Aires, Argentina, *Hauthal* 661 and Sierra de Solis, Uruguay = *S. levis;* Cochabamba, Bolivia and Rio Santa Lucia, Uruguay = *S. ramosa;* Ceres, Cordoba, Argentina = *S. ramosa* var. *diffusa*); not Macloskie in Rep. Princeton Univ. Exp. Patagon. viii. i. pt. 5, 395 (1905) which is probably *S. ramosa*.—South America: southeastern Brazil and Uruguay. Brazil: Prov. Santa Catharina: sandy sea coast, San Jose, *Ule* 472, October, 1886 (B., by using the date, locality fixed from Itiner. Ule in Mart. Fl. Bras. i. pt. 1. 125). Prov. Rio Grande do Sul: in pastures, Estancia Santo-Rei near San Francisco de Borja, *St. Hilaire* 2683 bis, March, 1821 (Paris, photo. in G.). Brazil, without stated locality: *St. Hilaire* (B., marked *Spergula grandis* Pers. by Kindb. 1861); *Sello* 3961[3] (B., 2 sheets, one marked *Spergula grandis* Pers. by Kindb., 1861); *Sello* 3727[3] (B., 2 sheets); *Sello* 3777[3] (B.); *Sello* (B., no data, marked *Spergularia levis* Camb. by Rohrbach); *Sello* (K., no data, mounted on a sheet with *Alsine marina* in Herb. Hook.); native of fields and plains, observed in flower in May, *Sello*, no number (K., the capsules with 3 valves, yet the seeds typical); *Sello* (Leiden, no data,

[1] Kindberg in his later Mon. Lepig. 18 (1863) excludes *Spergula grandis* Pers. from *Lepigonum* because it has 5 valves to the capsule.

[2] From Chile—3100–3200 m. (5.2.92.bl.n.425); although specimen has not been seen by the author, it cannot be *S. grandis*.

[3] According to the biographical sketch of *Sello* by Urban in Engler, Botanischer Jahrbucher, xvii. 196 (1893), collection comprising numbers "3624–4097 ebenda von Alegrete über die Misiones durch den nördlichen Teil des Staates nach Porto Alegre (Mai–Nov. 1826)."

plant typical). URUGUAY: Montevideo, *Commerson* (Paris, TYPE presumably, photo. in G., not marked by Persoon, but from Herb. Juss. 13052).

This species is closely related to both *S. ramosa* and *S. levis*, having characters of both. The seed-body is like that of *S. levis* but the wing is like that of *S. ramosa*. The plant has long internodes both below and within the inflorescence, as does *S. levis*, but it has pubescent calyces as in *S. ramosa*. The capsule exceeds the calyx by 2–3 mm. as does that of *S. levis*, while that of *S. ramosa* is about equal to the calyx. *S. grandis*, however, has one distinctive character, one which is anomalous in the genus, 4–5 valves to the capsule. The range of *S. grandis* is roughly within the ranges of both *S. ramosa* and *S. levis*. These facts should provoke cytogenetic experiments.

39. S. **pazensis** (Rusby), comb. nov. (PLATE 596, FIGS. 5a–5c and MAP 33). Perennial: *caudex* well developed, branched and knotted, bearing from 3–∞ diffuse stems, 10–45 cm. tall; *internodes of stem below the inflorescence* always glandular-pubescent, 7–50 mm. long, 0.8–1.5 mm. in diameter: *leaves* fascicled, mucronate, the upper usually glandular-pubescent, the lower often glabrous, 7–35 mm. long, 0.4–1 mm. wide; *stipules* broadly lanceolate, acuminate, 4–7 mm. long: *inflorescence a lax cyme* with densely glandular-pubescent *internodes* 8–40 mm. long, 0.4–0.8 mm. wide and densely pubescent *bracts* 1–7 mm. long: *sepals* linear, acute, densely covered with long, spreading glandular pubescence, often purple-tipped, 5.8–10 mm., usually 6–8 mm. long; *petals* white, ovate, 4–6 mm. long, as much as 1–2.4 mm. shorter than the calyx; *stamens* 7–10; *styles* 3, separate to the base, 1–1.8 mm. long: *mature capsules* 6.2–8.4 mm. long, equal to or as much as 0.2–2 mm. longer than the calyx:[1] *fruiting pedicels* filiform, glandular-pubescent, never reflexed, 3–30 mm., usually 10–30 mm. long: *seeds pyriform, dark brown or black, glistening, surface deeply sculptured in vermiform pattern but often so molded as to obscure the definite pattern of the depressed sculpture, usually covered with large, dark papillae*,[2] which are occasionally confined to the swollen rim, 0.8–1 mm. long, *usually surrounded by a nearly entire, broad, white wing*, 0.3–0.4 mm. wide, *with a blackish zone next to the seed*, occasionally surrounded by a very narrow, black, heavy rim.—*Tissa villosa* (Pers.) Britt. in Bull. Torr. Bot. Club xvi. 62 (1889), as to plant but not name. *Tissa pazensis* Rusby in Bull. New York Bot. Gard. vi. 503 (1910). *Spergularia villosa* (Pers.) Buchtien, Contrib. Fl. Bolivia pt. 1. iii. (1910), as to plant but not name.—SOUTH AMERICA: Found only in Bolivia. BOLIVIA: DEPT. LA PAZ: 10,000 ft. near La Paz, *Rusby* 1180, April, 1885 (N. Y., G.);[3] stony cliff, 3500 m. alt.,

[1] In one case the capsule is shorter than the calyx, i. e. Unduavi Valley, *Bro. Julio* 495.

[2] Rarely with no papillae, i. e. Totora, *Herzog* 2037a, which is the only example.

[3] Cited under *Tissa villosa* by Britt. in Bull. Torr. Club, xvi. 62 (1889).

La Paz, *Pennell* 14223, May 19–20, 1925 (F. M.); 11500 ft. alt., La Paz, *Williams* 2336, August 20, 1907 (N. Y., TYPE, U. S.); arid slopes, 3750 m., La Paz, *Buchtien* 520, 520a, December 14, 1918 (N. Y., F. M., U. S.); 547, same locality and date (N. Y., F. M.); alt. 3800 m., La Paz, *Buchtien* 520, December 12, 1919 (F. M.); about 3600 m. alt., La Paz, *G. Hammarlund* 482, 20/4–10/5, 1934 (N. Y., F. M.); 12–13000 ft. alt., La Paz, *R. Pearce*, May, 1865 (K.); brushwood formation 3700 m. alt., La Paz, *Troll* 4342, September 5, 1926 (B., immature); La Paz, *Seler* 118, June 20, 1910 (B., immature); La Paz, *Rose* 18904, August 15, 1914 (U. S.); dry mountain slope, 3800 m. alt., La Paz, *Buchtien* 9, May 20, 1906 (U. S.); Unduavi, *Bro. Julio* 387 (U. S.); sunny slopes about 3700 m. alt. at La Paz, *Th. Herzog* 2451, September, 1911 (B., immature); 2360 m. alt., base of Mt. Illimani, Rio Palca Valley, *Bro. Julio 51* (U. S., immature); 2600 m. alt., Unduavi Valley, *Bro. Julio* 495 (U. S.); Talca Chugiaguillo, *Bang* 814, April, 1890 (N. Y., B., U. S., G.); 10,000 ft. alt., Sorata, *G. H. H. Tate* 767, May 1, 1926 (N. Y.); 6,000 ft. alt., Yungas, *Rusby* 1181, 1885 (N. Y., G., U. S., immature but of lax habit, cited as *Tissa villosa* (Pers.) by Britton).[1] DEPT. COCHABAMBA: 3000 m. alt. on Rio Tapacari, *Kuntze*, March 19, 1892 (N. Y., immature but with short internodes, marked *Buda grandis* by Kuntze); on high plateaus about 3000 m. alt., Totora, *Th. Herzog* 2037a, April, 1911 (Leiden, lax inflorescence). DEPT. TARIJA: 3500 m. alt., Escayache bei Tarija, *Fiebrig* 2793, March 29, 1904 (F. M., B., short internodes and inflorescences, habit like the average *S. ramosa*).

Generally distributed as *Tissa villosa* (Pers.) Britt.

There is a remarkable similarity between *S. pazensis* and *S. ramosa*. The measurements of leaves, stipules, internodes of the lower part of the stem and the first node of the inflorescence, sepals, petals, and capsule are practically the same. Yet the species separate at once upon examination of the seed-characters. The seeds of *S. pazensis* are black or nearly so, 0.8–1 mm. long, pyriform in outline, covered with large, black, hardened papillae, and surrounded by a wing 0.3–0.4 mm. wide. *S. ramosa* has light brown, non-sculptured seeds, rounded in outline, 0.7–0.8 mm. long, with a wing usually 0.4–0.6 mm. wide, and sometimes with light brown papillae. There are no transitions between these two easily recognizable types of seeds. In addition, the length of the inflorescence of *S. pazensis* is often much greater and the pedicels much longer than those of *S. ramosa*. The lower internodes of *S. pazensis* are generally longer than those in the majority of the collections of *S. ramosa*. Even though these latter differences are only ones of degree, *S. pazensis* has generally a more lax, sprawling habit.

[1] Britt. Bull. Torr. Bot. Club, xvi. (Enum. Pl. coll. Rusby in So. America 1885–1886), 62 (1889).

Examination of Bolivian collections of *S. ramosa, q. v.* shows a tendency toward this sprawling, open habit seen in the following collections: Cochabamba, *Kuntze*, March 26, 1892; Cochabamba, *Bro. Julio II* 262; Cochabamba, *Parodi* 10193; Ceritos, *Lillo* 4007. However, collections from Sorata, *Williams* 1541 and *Mandon* 946, are more characteristic of *S. ramosa.* It is interesting to note that the following collections of *S. pazensis* because of either short, compact inflorescences or short internodes below (or both) show a tendency toward *S. ramosa:* La Paz, *Troll* 4342; La Paz, *Herzog* 2451; part of Talca Chugiaguillo, *Bang* 814; Tarija, *Fiebrig* 2793; La Paz, *Buchtien* 547.

40. S. RUPESTRIS Camb. (PLATE 596, FIGS. 3a–3c and MAP 34). Perennial, glandular-pubescent throughout: *caudex* bearing 1–? stems, 20–30 cm. tall; *internodes of stem below the inflorescence* 5–15 mm. long, 0.6–1.4 mm. in diameter: *leaves filiform,* densely glandular-pubescent, very strongly mucronate, *fascicled,* 10–25 mm. long, 0.3–0.5 mm. wide; *stipules* broadly lanceolate, *very large and persistent on the old stems,* acuminate, 4–8 mm. long: *inflorescence* a few-flowered, lax cyme, *internodes* 6–11 mm. long, densely glandular-pubescent; *bracts* foliaceous below, becoming minute above, 2–10 mm. long: *sepals* linear, acute, densely glandular-pubescent, 5.4–6.4 mm. long; *petals* white, ovate, 4.6–5.8 mm. long, always shorter than the calyx by 0.2–1 mm.; *stamens* 7–10; *styles* 3, united over half way up or separated to the base, 1–1.2 mm. long: *mature capsules* 4.2–6.8 mm. long, equal to or as much as 0.8 mm. shorter or longer than the calyx; *fruiting pedicels* filiform, densely glandular-pubescent, the lowest 8–12 mm. long: *seeds* 0.7–0.8 mm. long, *light brown, rounded in outline, surface smooth or slightly roughened, not sculptured, densely covered with brown papillae, with a narrow scarcely erose wing,* 0.1–0.3 mm. wide, often with a brownish zone next to the seed.—In St. Hilaire, Fl. Bras. ii. 176 (1829); G. Don, Gen. Hist. Dichl. Pl. i. 426 (1831); not *S. rupestris* Lebel, Rech. Pl. Ile de Manche, 12 (1848);[1] Steud. in Flora, 424 (1856), as to source of name but not as to plants cited, *Bertero* 810 and 58, which are *S. villosa;* Philippi, Anal. Univ. Chile, lxxxi. 771 (1892), as to source of name, not plants which are *S. villosa* (see Steud. above). *Spergula rupestris* (Camb.) D. Dietr. Syn. Pl. ii. 1598 (1840). *Lepigonum trachyspermum* Kindb. Mon. Lepig. 31, t. ii. fig. 16 (1863), in part,

[1] *Spergularia rupestris* Lebel is an entirely different European plant and no reference is made to Cambessedes' work. Lebel, Revis. du Gen. Spergularia from Mém. Soc. Imper. Sci. Nat. Cherbourg, xiv. 23 (1868), renamed his European plant *S. rupicola.* The following references are synonymous with *S. rupicola* Lebel: *Lepigonum rupestre* (Lebel) Kindb. Synop. Lepig. 8 (1856) and Mon. Lepig. 29 t. ii, fig. 13 (1863), excluding only the citation Montevideo Am. Mer., *Sello* (B.), one of which specimens was marked *L. rupestre* (Lebel) Kindb. 1861 and is really *S. marina* (L.) Griseb., *q. v.; Corion rupestre* (Lebel) N. E. Brown in Syme, Engl. Bot. ed. 3. Suppl. 49 (1891); *Alsine rupestris* (Kindb.) Druce in Ann. Scot. Nat. Hist. 221 (1906).

(part of the Montevideo, *Sello*, collections marked *L. villosum*—a synonym according to Kindberg of *L. trachyspermum*—are *S. rupestris*). *Lepigonum trachyspermum* * subsp. *murale* Kindb. Mon. Lepig. 31, t. ii. fig. 17 (1863) in part (including only the right-hand figure with a winged seed and the citation, Montevideo, *Sello*, which specimen was marked *L. murale* by Kindberg, 1861, excluding the left-hand figure and the European plants discussed which are all *S. rupicola* Lebel). *Spergularia villosa* var. α. *genuina* Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 268, t. 69, fig. 1 (1872), in part (including the reference *L. murale* Kindb. and the right-hand narrow-winged seed in figure and the part of the description dealing with seeds rarely narrowly winged; the remaining information referring to *S. ramosa, q. v.*); Rohrb. in Linnaea, xxxvii. 238 (1871–73), in part (including the reference *L. murale* Kindb. and citation Pâo de Assucar near Maldonado, *St. Hilaire* and the narrow-winged seeds of description, excluding all the other references and probably all the other citations which all belong with *S. ramosa, q. v.*). *S. villosa* var. γ *rupestris* (Camb.) Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 269, t. 61, fig. 1 (1872), including only the narrow-winged seed in the figure; Rohrb. in Linnaea, xxxvii. 240 (1871–73); Arech. in Anal. Mus. Nac. Montevideo, iii. (Fl. Uruguay, i.) 94 (1901).[1]—SOUTH AMERICA: only in Uruguay, evidently in rocky habitats. URUGUAY: DEPT. MALDONADO: 200–500 m. alt., Sierra Animas, Pan de Azucar, *Herter* 2119, February, 1907 (B.); 0–300 m. alt., Pan de Azucar, *Herter* 2135, February 25, 1907 (B.); 0–300 m. alt., Pirapolis, *Herter* 10436, October 10, 1907 (B., immature); inter saxa, Punta Ballena, *Herter* 652c, December 27, 1931 (G.); Banda Oriental del Uruguay, *St.-Hilaire* 2063?, rochers nus, Bragados and 2141 ter, with no definite locality (Paris, TYPE COLLECTIONS?[2], photo. in G., one label—left-hand—has only *Spergularia rupestris* +[3] probably in Cambessedes' handwriting,[4] the other has the same in the hand of Spach); rochers nus, Bragados, *St. Hilaire* 2063 ter (B., marked *Lepigonum arenarium* Kindb. 1861). DEPT. MONTEVIDEO: Montevideo, *Sello* d.2[5] (also R. v. Campos-Victoria) (B. 2 sheets; K., probably d.21, only part of the plants on each sheet); Montevideo, *Sello* d394 (B., 3 sheets,[6] one marked *L. murale* Kindb. 1861 and *Spergularia villosa* (Pers.) Camb. by Rohrbach). BRAZIL:

[1] *Buda rupestris* F. Hanb. Lond. Cat. Pl. ed. 9, 12 (1895), *nomen nudum*.

[2] The type locality given in St. Hilaire, Fl. Bras. ii. 176 (1829) is: cracks of rocks at base of Mt. Pâo de Assucar not far from the city Maldonado "in parte orientali provinciae Cisplatinae"; this evidently does not appear upon any specimens located at the Paris Museum. Photo. and data by courtesy of Mr. C. A. Weatherby.

[3] The + may be used for the same reason as the dagger (†) used after new species in St. Hilaire, Fl. Brasiliensis.

[4] Fide Mr. C. A. Weatherby.

[5] Locality found more definitely from Urban, in Engler, Bot. Jahrb. xvii. 177 (1863), *Sello*—"d. 1–740 im südlichen Teile von Uruguay (1821–22)."

[6] Cited under *Lepigonum trachyspermum* subsp. *murale* Kindb., Mon. Lepig. 31, t. 2, fig. 17 (1863) and cited under *S. villosa* var. *a. genuina* Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 268 (1872).

no locality, *Sello* (Leiden, probably the same as one of the Montevideo (*Sello*) collections).

This species is easily confused with *S. villosa* in general habit but differs from it in having longer sepals, a longer style, and larger, light brown, narrowly winged seeds. It is more easily confused with *S. fimbriata* of the Canary Is. but differs in having white instead of rosy petals, densely glandular-pubescent instead of smooth or nearly smooth leaves and light brown seeds with entire-margined wing, smooth surface, and widely spaced papillae, as opposed to black seeds with fimbriate wing, strongly pebbled surface and more minute, crowded papillae. The two species are similar in length of sepals, capsules, stipules, and size of seed.

Rare Exotics

S. Dillenii Lebel (probably). Like *S. marina* except that the seeds are often more reddish-brown, tinged with silver, more densely papillose, and with a more roughened surface.—Revis. Gen. Spergularia in Mém. Sci. Nat. Cherb. xiv. 43 (1868).—South America: introduced from Europe into Chile. Chile: Prov. Talca: Ilico, *Barros* 268, October 19, 1938 (G.). Prov. Santiago: 500 m., Batuco, *Looser* 3452 (G., Cal. Acad.) and 3450 (G.), October 3, 1936; Batuco, *Looser* 3455, November 8, 1937 (G.); Batuco, *Philippi* 1864 (G.). Prov. Coquimbo: Ovalle, *Claude-Joseph* 5196, October, 1927 (U. S.); Ovalle, *Barros* 247, September 22, 1927 (G.); La Serena, Punta de Teatinos, *Werdermann* 874, November, 1925 (G., U. S., N. Y., Cal. Acad., B., F. M.).

I am indebted to Dr. Eugène Simon of Tours, France for this identification. Dr. Simon says of the collections, *Werdermann* 874, and *Looser* 3452, "ne sont pas exactement le *Dillenii*, mais j'estime qu'ils doivent lui être rattachés."

Since the author has been able to gain only a cursory knowledge of European species, all that can be done is to mention again the similarity of this plant to *S. marina* and to wonder what its relationships are in its native home.

S. ? A heavy, large-flowered, glandular-pubescent perennial: *leaves* fascicled; *stipules* broadly lanceolate-acuminate, 4–5 mm. long: *sepals* heavily glandular-pubescent, 5–6.6 mm. long; petals white, 6 mm. long: *mature capsules* very large, 6–8 mm. long: *seeds* dark brown, nearly black, with a silvery tinge, deeply sculptured in areolar, vermiform pattern, covered with widely spaced, hard, black papillae or not, 0.7–0.8 mm. long, surrounded by a white, scarious wing, 0.1–0.2 mm. broad.—South America: introduced perhaps from Australia to the coast of Chile. Chile: Prov. Aconcagua: Valparaiso,

Jaffuel 948, October, 1910 (G.); Algarrobo, Punta de Talca, *Barros* 265, January, 1914 (G.); Prov. Aconcagua, *Philippi*, 1862 (B.). Prov. Santiago: San Antonio, *Claude-Joseph* 297, November, 1924 (U. S.). Prov. ? : Costa, *Claude-Joseph* 1229, November 4, 1920 (U. S.).

It is probable that these plants are introduced because they occur only in ports in central Chile. However, among the meagre collections of foreign Spergularias which I have been able to see, one from South Australia: Port Adelaide, roadside, *Mrs. Sabine Helms* 21, Oct. 1928 (U. C.) seems a fair match; but it may be introduced there also. At present, nothing definite can be said as to a name for these plants. It can be said that they are distinctly different from *S. rupicola* and *S. media* of Europe in type of seeds but similar in habit.

Doubtful Names

Lepigonum chilense Fisch. & Meyer, Ind. Sem. Hort. Petr. iii. 14 (1837), *nomen nudum.*

Melargyra purpurea Rafinesque, Fl. Tellur. iii. 81 (1836), *nomen nudum.*

Melargyra rosea Rafinesque, l. c. The description given might fit any rose-flowered *Spergularia* of the region. Type not found.

Spergularia araucana Philippi in Anal. Univ. Chil. lxxxi. 764 (1892). Type not found in Museo Nacional, Santiago, Chile.

Spergularia cerastiodes Foucaud mss. ex H. Ross in Oesterr. Botan. Zeitschr. lvii. 451 (1907), based on a collection from Corral, Chile, *H. Krause* in Herb. München, which I have not seen. No description given.

Spergularia oligantha Philippi in Anal. Univ. Chil. lxxxi. 770 (1892). Type not found in Museo Nacional, Santiago, Chile.

Excluded Species

Spergularia arvensis Camb. in St. Hil. Fl. Bras. Mer. ii. 179 (1829), is *Spergula arvensis* L.

Spergularia leptophylla G. Don, Gen. Hist. Dichl. Pl. 425 (1831), based upon *Arenaria leptophylla* Cham. & Schlecht. in Linnaea, v. 233 (1830).

Lepigonum mollugineum Kindb. Synop. Lepig. 11 (1856), based upon *Alsine mollugginea* Lagasca, Gen. et Spec. 13, no. 170 (1815), which is a *Drymaria.*

Lepigonum paradoxum Kindb. Synop. Lepig. 15 (1856), based upon *Arenaria paradoxa* Bartl. ex Presl, Rel. Haenk. ii. 15 (1831), which certainly is not a *Spergularia.*

Tissa alsinella Greene ex C. F. Baker, West. Am. Plants, ii. 18 (1903), *nomen nudum.* Plant cited is not a *Spergularia.*

Spergularia squarrosa Muschler in Engl. Bot. Jahrb. xlv. 461 (1911); Macbride, Field Mus. Pub. Bot. xiii. pt. 2, 632 (1937); both based upon *Weberbauer* 57 (B., photo. in F. M., G.) which is a *Drymaria.*

Explanation of Plates 589–596

Plate 589. Spergularia macrotheca: fig. 1a, sepals with capsule, × 5, from the Presidio, San Francisco, California, *Heller* 5700; fig. 1b, seed, × 25, from 5700; fig. 1c, style, × 5, from Monterey, California, *Elmer* 4387.

S. macrotheca var. leucantha: fig. 1d, style, × 5, from San Bernardino, California, *S. B. Parish* 4755.

S. macrotheca var. longistyla: fig. 1e, seed, × 25, from the type, from near Altamont, Alameda Co., California, *G. B. & R. P. Rossbach* 611; fig. 1f, style, × 5, from 611.

S. canadensis: fig. 2a, sepals with capsule, × 5, from Lower Argyle, Yarmouth Co., Nova Scotia, *Fernald et al.* 21189; fig. 2b, a non-papillose seed, × 25, from Bathurst, New Brunswick, *Blake*, August 13, 1913; fig. 2c, a papillose seed, × 25, from capsule of *Fernald* 21189; fig. 2d, stipule, × 5, from same plant as fig. 2b.

S. atrosperma: fig. 3a, sepals with capsule, × 5, from the type, from Los Banos Hills, Merced Co., California, *J. T. Howell* 13826; fig. 3b, seed, × 25, from type; fig. 3c, stipule, × 5, from type.

S. mexicana: fig. 4a, sepals with capsule, × 5, from Pachuca, Hidalgo, Mexico, *Pringle* 6913; fig. 4b, stipule, × 5, from 6913; fig. 4c, seed, × 25, from 6913.

S. diandra: fig. 5a, sepals with capsule, × 5, from Hayden Island in the Columbia River, Oregon, *J. C. Nelson* 2958; fig. 5b, seed, × 25, from 2958; fig. 5c, stipule, × 5, from 2958.

S. rubra: fig. 6a, sepals with capsule, × 5, from Martha's Vineyard Island, Massachusetts, *F. C. Seymour* 1198; fig. 6b, seed, × 25, from 1198; fig. 6c, stipule, × 5, from 1198.

S. Bocconi: fig. 7a, sepals with capsule, × 5, from Pacific Grove, Monterey Co., California, *Heller* 6797; fig. 7b, seed, × 25, from 6797; fig. 7c, stipule, × 5, from 6797.

Plate 590. S. media: fig. 1a, sepals with capsule, × 5, from Syracuse, New York, *Wiegand* 6409; fig. 1b, stipule, × 5, from 6409; fig. 1c, seed, × 25, from 6409.

S. echinosperma: fig. 2a, sepals with capsule, × 5, from Corpus Christi, Texas, *Benke* 5360; fig. 2b, seed, × 25, from Pecos, Texas, *E. J. Palmer* 34027; fig. 2c, stipule, × 5, from 34027.

S. marina: fig. 3a, sepals with capsule, × 5, from Aliso Canyon, Laguna Beach, Orange Co., California, *D. L. Crawford*, July 26, 1916; fig. 3b, papillose seed, × 25, from same plant as fig. 3a; fig. 3c, smooth seed, × 25, from Balboa, Orange Co., California, *Abrams* 6565; fig. 3d, seed with a few scattered papillae, × 25, from Tracadie, Gloucester Co., New Brunswick, *Blake* 5648; fig. 3e, stipule, × 5, from same plant as fig. 3a.

S. congestifolia: fig. 4a, sepals with a nearly mature capsule, × 5, from the type, from Mollendo, Prov. Islay, Peru, *I. M. Johnston* 3567; fig. 4b, stipule, × 5, from type.

S. arbuscula: fig. 5a, long blunt sepals with hidden capsule, × 5, from Limari, Frai Jorge, Prov. Coquimbo, Chile, *Werderman* 894; fig. 5b, short, reflexed, acute sepals with capsule, × 5, from vicinity of Aguada de Miguel Diaz, Prov. Antofagasta, Chile, *I. M. Johnston* 5357; fig. 5c, short, broad sepals with capsule, × 5, from just north of Caldera, Prov. Atacama, Chile, *I. M. Johnston* 5066; fig. 5d, seed, × 25, from 5066; fig. 5e, stipule, × 5, from Puerto de Chañaral, Prov. Atacama, Chile, *I. M. Johnston*, 4753.

Plate 591. The type of "*Arenaria foliis linearibus longitudine internodiorum*" Linn. Hort. Cliff.; therefore the type of *Arenaria rubra β. marina*

L. Sp. Pl. (see discussion of *S. marina*). From the Clifford Herbarium at the British Museum by the courtesy of Mr. J. Ramsbottom.

Plate 592. The plant cited as the basis for "*Arenaria foliis longitudine internodiorum*" Gronovius, Fl. Virg., which is a synonym of *Arenaria rubra β. marina* L. Sp. Pl. (see discussion of *S. marina*). From the Clayton Herbarium at the British Museum by the courtesy of Mr. J. Ramsbottom.

Plate 593. S. fasciculata: fig. 1a, sepals with capsule, × 5, from Arequipa, Dept. Arequipa, Peru, *G. H. H. Tate* 1197; fig. 1b, seed, × 25, from 25–2600 m. alt. above Arequipa, Dept. Arequipa, Peru, *Pennell;* fig. 1c, stipule, × 5, from *Tate* 1197; fig. 1d, style, × 5, from same plant as fig. 1b.

S. andina: fig. 2a, sepals with capsule, × 5, from type, from Azangaro, Dept. Puno, Peru, *Lechler* 1772; fig. 2b, seed, × 25, also from Azangaro, *Weberbauer* 456; fig. 2c, stipule, × 5, from same plant as fig. 2a.

S. depauperata: fig. 3a, sepals with capsule, × 5, from type collection from Chile, *Gay;* fig. 3b, seed, × 25, from the cordillera of Chillan, Prov. Nuble, Chile, *Felsen* 142; fig. 3c, stipule, × 5, from Gay.

S. Pissisi: fig. 4a, sepals with capsule, × 5, from Quebrada Alfalfa, Prov. Atacama, Chile, *I. M. Johnston* 5985; fig. 4b, seed, × 25, from Banos del Toro, Prov. Coquimbo, Chile, *Espinosa,* February 26, 1938; fig. 4c, stipule, × 5, from 5958.

S. cremnophila: fig. 5a, sepals with capsule, × 5, from type, from Aguada Cachina, Prov. Antofagasta, Chile, *I. M. Johnston* 5683; fig. 5b, a dull, sculptured seed, × 25, from 5683; fig. 5c, a lustrous, smooth seed, × 25, from near Aguada Grande, Prov. Antofagasta, Chile, *I. M. Johnston* 5821; fig. 5d, stipule, × 5, from 5683; fig. 5e, stipule, × 5, from 5821.

Plate 594. S. aberrans: fig. 1a, sepals with capsule, × 5, from Antofagasta, Chile, *Jaffuel* 1136; fig. 1b, seed, × 25, from type, from Antofagasta, Chile, *I. M. Johnston;* fig. 1c, stipule, × 5, from type.

S. stenocarpa: fig. 2a, sepals with capsule, × 5, from between Quebrada San Ramon and Paso Malo, Prov. Antofagasta, Chile, *I. M. Johnston* 5177; fig. 2b, seed, × 25, from vicinity of Paposo, Prov. Antofagasta, Chile, *I. M. Johnston* 5604; fig. 2c, seed, × 25, from vicinity of Taltal, Prov. Antofagasta, Chile, *I. M. Johnston* 5162; fig. 2d, stipule, × 5, from 5177.

S. denticulata: fig. 3a, sepals with capsule, × 5, from Aguada Grande, Prov. Antofagasta, Chile, *I. M. Johnston* 5822; fig. 3b, seed, × 25, from 5822; fig. 3c, stipule, × 5, from 5822.

S. Cerviana: fig. 4a, sepals with capsule, × 5, from type, from Talcaguano, Prov. Concepcion, Chile, *Chamisso;* fig. 4b, sepals with capsule, × 5, from Antuco, Prov. Nuble, Chile, *Pöppig* 125; fig. 4c, seed, × 25, from 125; fig. 4d, stipule, × 5, from type, *Chamisso.*

S. floribunda: fig. 5a, sepals with capsule, × 5, from the type collection, from vicinity of La Serena, Prov. Coquimbo, Chile, *Gay;* fig. 5b, seed, × 25, from type collection, *Gay;* fig. 5c, stipule, × 5, from type collection, *Gay.*

S. pycnantha: fig. 6a, sepals with capsule, × 5, from the type, from Huasco, Prov. Atacama, Chile, *Jaffuel* 1164; fig. 6b, seed, × 25, from type; fig. 6c, stipule, × 5, from type.

S. villosa: fig. 7a, sepals with capsule, × 5, from Pangal, Limache, Prov. Valparaiso, Chile, *G. Looser,* October 12, 1926; fig. 7b, a non-papillose seed, × 25, from Arauco, Prov. Arauco, Chile, *Pennell* 12933; fig. 7c, a papillose seed, × 25, from Campana, Prov. Buenos Aires, Argentina, *Parodi* 8608; fig. 7d, stipule, × 5, from same plant as fig. 7a.

S. confertiflora: fig. 8a, sepals with capsule, × 5, from the type collection, from Juan Fernandez Islands, Chile, *Bertero* 1431; fig. 8b, seed, × 25, from 1431; fig. 8c, stipule, × 5, from 1431.

Plate 595. S. ramosa: fig. 1a, sepals with capsule, × 5, from Tumbaya, Prov. Jujuy, Argentina, *Venturi* 4900; fig. 1b, papillose seed, × 25, from Santa Lucia, Dept. San José, Uruguay, *Osten* 21691; fig. 1c, a smooth seed,

× 25, from Campana, Prov. Buenos Aires, Argentina, *Parodi* 11326; FIG. 1d, stipule, × 5, from 21691.

S. RAMOSA var. DIFFUSA: FIG. 1e, seed, × 25, from the TYPE, from Burruyacu, Prov. Tucuman, Argentina, *Venturi* 7722; FIG. 1f, sepals with capsule, × 5, from TYPE; FIG. 1g, stipule, × 5, from TYPE.

S. SPRUCEANA: FIG. 2a, sepals with capsule, × 5, from the TYPE, from the Andes of Ecuador, *Spruce* 5444; FIG. 2b, seed, × 25, from TYPE; FIG. 2c, stipule, × 5, from TYPE.

S. PLATENSIS: FIG. 3a, sepals with capsule, × 5, from Los Angeles, California, *Parry* 15, 1881; FIG. 3b, a papillose seed, × 25, from 15; FIG. 3c, a non-papillose seed, × 25, from Otay, Riverside Co., California, *Orcutt* 1201; FIG. 3d, stipule, × 5, from Rio Sali, Prov. Tucuman, Argentina, *Venturi* 1908.

S. PLATENSIS var. BALANSAE: FIG. 3e, sepals with capsule, × 5, from TYPE, from Paraguay, *Balansa* 2271; FIG. 3f, stipule, × 5, from TYPE.

S. COLLINA: FIG. 4a, sepals with capsule, × 5, from Mollendo, Prov. Islay, Peru, *A. S. Hitchcock* 22355; FIG. 4b, seed, × 25, from 22355; FIG. 4c, stipule, × 5, from 22355.

PLATE 596. S. GRANDIS: FIG. 1a, sepals with capsule, × 5, from San Jose, Prov. Santa Catharina, Brazil, *Ule* 472; FIG. 1b, seed, × 25, from 472; FIG. 1c, stipule, × 5, from 472.

S. LEVIS: FIG. 2a, sepals with capsule, × 5, from Montevideo, Uruguay, *Sello*, October 22; FIG. 2b, seed, × 25, from Concepcion del Uruguay, Prov. Entre Rios, Argentina, *Lorentz*, October, 1875; FIG. 2c, stipule, × 5, from Montevideo, Uruguay, *Gibert*, October, 1858.

S. RUPESTRIS: FIG. 3a, sepals with capsule, × 5, from Montevideo, Uruguay, *Sello* d394; FIG. 3b, seed, × 25, from 394; FIG. 3c, stipule, × 5, from 394.

S. COLOMBIANA: FIG. 4a, sepals with capsule, × 5, from the TYPE, from Prov. Bogota, Colombia, *Triana*, 1851–1857; FIG. 4b, stipule, × 5, from the TYPE.

S. PAZENSIS: FIG. 5a, sepals with capsule, × 5, from Talca Chugiaguillo, Dept. La Paz, Bolivia, *Bang* 814; FIG. 5b, seed, × 25, from 814; FIG. 5c, stipule, × 5, from La Paz, Bolivia, *R. S. Williams* 2336.

POTENTILLA GRACILIS Dougl., var. **pulcherrima** (Lehm.), comb. nov. *P. pulcherrima* Lehm. Nov. Stirp. Pug. ii. 11 (1830).

I fail to find in *P. pulcherrima* any specific characters to separate it from *P. gracilis.* In its best development it is distinguished by the heavy white tomentum of the lower leaf-surfaces and by the shorter and more approximate teeth. It seems to be one end of a series, of which *P. gracilis*, var. *rigida* (Nutt.) Wats. (*P. Nuttallii* Lehm.) is at the other. Although Wolf, Mon. Gen. Pot. (1908), followed Rydberg in keeping the three apart, it is noteworthy that in his key and diagnoses he could state only the difference in degree of pubescence and of marginal toothing, specially noting (p. 209) that *P. pulcherrima* is very close to *P. gracilis.*—M. L. FERNALD.

DETERMINATION OF AMPHICARPA, STROPHOSTYLES, GALACTIA AND APIOS BY VEGETATIVE CHARACTERS.—Sterile trifololiate forms of *Apios americana* are often confused with species of *Strophostyles, Amphicarpa,* and *Galactia,* and the latter three genera are frequently mis-

understood. Certain specimens in each of the four genera at times superficially approach one another in gross similarity, and are likely to be mistaken in the field or herbarium.

The writer has found certain of the following vegetative characters helpful in identifying these genera in the sterile condition.

	APIOS	STROPHOSTYLES	AMPHICARPA	GALACTIA VOLUBILIS and VARIETIES
Main stipule at base of petiole.	Linear-setaceous, 1-nerved.	Ovate, lanceolate, 1–3, or 5–7-nerved.	Ovate, 10–12-nerved.	Linear-setaceous, 1-nerved.
Lateral stipule at base of petiolule.	Setaceous, conspicuous, 1-nerved	Oblong-spatulate, lanceolate-oblong, conspicuous, 3-nerved.	Ovate, conspicuous, 3-nerved.	Setaceous, inconspicuous, 1-nerved.
Apex of leaves.	Acute to acuminate.	Obtuse to acutish.	Acute.	Obtuse.
Lowest pair of lateral nerves at base of leaflet.	Inconspicuous.	Conspicuous. Mostly parallel to the curving margins of the leaflets.	Conspicuous. Mostly straight and upwardly divaricate, not parallel to the margins of the leaflets.	Inconspicuous.
Tuberous enlargements.	Large.	None.	Slight.	Slight.
Hairs on stems.	Retrorse.	Retrorse.	Retrorse.	Ascending.

They may be keyed out as follows:

a. Stipule at base of petiole setaceous. . . . *b.*
  b. Leaves acute to acuminate at apex. . . . . *Apios americana.*
  b. Leaves obtuse or rounded at apex. . . . . . . *Galactia volubilis* and varieties.
a. Stipule at base of petiole ovate, lanceolate, or oblong-lanceolate. . . . *c.*
  c. Stipule at base of petiole 1–3- or 5–7-nerved; stipule at base of petiolule spatulate, oblong-spatulate, or oblong-lanceolate; no underground tuberous enlargement; 2 lateral nerves at base of leaflet arching parallel to margin of leaflet. . . . . *Strophostyles.*
  c. Stipule at base of petiole 10–12-nerved; stipule at base of petiolule ovate or broadly lanceolate; slight underground tuberous enlargement; 2 lateral nerves at base of leaflet not arching parallel to margin of leaflet, but directed straight and more divaricate. . . . . *Amphicarpa.*

In his Leguminous Plants of Wisconsin, Dr. Fassett brings out a further difference between *Strophostyles* and *Amphicarpa*, i. e., in *Amphicarpa* the midrib is prolonged at the tip of the leaf-blade into a minute bristle, whereas in *Strophostyles* it is not prolonged. This

difference accounts for the leaves of *Amphicarpa* usually appearing acute at the apex, whereas those of *Strophostyles* appear obtuse or only acutish.—JULIAN A. STEYERMARK, Field Museum of Natural History, Chicago, Illinois.

SPRING FLORA OF MISSOURI.—In his new "Spring Flora of Missouri,"[1] which treats some fourteen hundred flowering plants in blossom by June first, Dr. Julian A. Steyermark has brilliantly succeeded in combining simplified terminology with precise scientific accuracy and authoritativeness. Though he dismisses the Gramineae, Cyperaceae and Juncaceae with brief mention, Dr. Steyermark points out that these groups of plants are to form the basis of a future publication devoted exclusively to them.

Written particularly for all persons interested in flowering plants, the book is well printed, with few typographical errors, on an excellent grade of paper and is bound in a durable buckram. Though designed to include the spring flora of neighboring states, as well as of Missouri, its use would seem to be restricted primarily to the latter, especially since distribution data for each species are given for Missouri alone. From a teacher's point of view, the utility of the book would have been further enhanced by brief mention, if only by means of abbreviations, of the North American range of each species. Along with the concise, non-technical descriptions of each species, Dr. Steyermark has occasionally included information regarding poisonous properties, and, in the case of dermatitis caused by Poison Ivy, he has even suggested detailed remedies. Such added notes serve to make the book of greater value and interest to the layman.

The non-technical keys to such difficult families of plants as the Umbelliferae, wherein dependence upon mature fruit-characteristics has been heretofore an almost universal practice, are constructed upon simpler but, perhaps, as equally accurate leaf- and inflorescence-characters. Whenever it has been necessary to use a convenient technical term, an accompanying diagram often serves to make the meaning clear. Furthermore, a short glossary of the relatively few scientific terms employed is provided at the back of the book. Adjacent to the glossary of terms there is an interesting list of "English Meanings of Scientific Species Names," a feature which, for the average layman or college student, should add much to an understanding of taxonomic nomenclature, especially since a knowledge of Latin and Greek is no longer a foundation-stone of education. Besides the diagrams illustrating technical terms, the keys are replete with line-drawings which add significantly to the general usage of the book.

Apparently as a result of employing several artists for illustrating the book, there is a pronounced lack of uniformity in styles of drawing. For example, on Plate 100, page 365, *Viola cucullata* is drawn

[1] STEYERMARK, J. A. *Spring Flora of Missouri.* vii. and 582 pp. Published by the Missouri Botanical Garden (St. Louis) and the Field Museum of Natural History (Chicago). Set up and printed by the Ovid Bell Press, Fulton, Mo. 1940.

with heavily shaded leaves, whereas the adjacent illustrations, as of the leaves of *V. papilionacea*, are represented (except for veins) merely in outline; or, on Plate 138, page 480, the illustration of *Penstemon Cobaeus* (fig. 3) is heavily shaded, whereas the other species figured on the page are not. Plates 21 (p. 95), 22 (p. 97) and 23 (p. 99), mainly of the Orchidaceae, appear to be done uniformly with heavy shading, but many of the plates of other families are figured by more simple, outline drawings. Yet such variation in style of illustration is not a serious fault, for it scarcely detracts from the high level of excellence of the entire work.

Differences of opinion may well arise with respect to Dr. Steyermark's taxonomic treatment of such plants as *Erythronium albidum* and *E. mesochoreum* which, by him, are maintained as distinct species. Yet Dr. H. W. Rickett[1] has clearly shown that, at least for certain regions in Missouri, the specific distinctions between the two "species" of *Erythronium* definitely break down, so that *E. mesochoreum* is more logically to be considered a variant ("ecotype") of *E. albidum*.

On the whole, however, the "Spring Flora of Missouri" is carefully and critically done, so that it should find wide and enthusiastic reception at the hands of all those amateurs and professionals alike, who enjoy becoming acquainted with the rich native flora of Missouri. Indeed, this book may well pave the way for more comprehensive state or regional manuals, written in a less technical fashion than has been adhered to heretofore, without a loss of scientific accuracy.—William B. Drew, University of Missouri, Columbia, Mo.

[1] Rhodora, xxxix. 101–105 (1937).

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No. III. The Linear-leaved North American Species of Potamogeton, Section Axillares, by M. L. Fernald. 183 pp., 40 plates, 31 maps. 1932. $3.00.

No. IV. The Myrtaceous Genus Syzygium Gaertner in Borneo, by E. D Merrill and L. M. Perry. 68 pp. 1939. $1.50.

Gray Herbarium of Harvard University, Cambridge, Mass.

HEDYSARUM GREMIALE: FIG. 1, ISOTYPE, × ⅓; FIG. 2, loments, × 3; FIG. 3, summit of flowering raceme, × 3.

Rhodora

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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. CXXXI

I. STUDIES IN THE GENUS HEDYSARUM IN NORTH AMERICA

Reed C. Rollins[1]

(Plate 597)

Setaceous processes upon the reticulate lines or rib-like markings of the loments of *Hedysarum* are found in species which occur in northern Africa, certain parts of Europe and in Asia, but no species with this unusual characteristic has been recorded from America. It was, therefore, quite surprising when in 1937 plants of this genus with fruits bearing numerous setae were discovered growing in a decidedly undisturbed native habitat in the Uinta Basin of northeastern Utah. This discovery immediately raises the question as to whether these outgrowths upon the fruits are merely parallel developments in unrelated sections of *Hedysarum* or whether they indicate a close fundamental relationship between all species that possess them, despite wide geographic separation. If the latter is true, it will be agreed that a new interpretation of the geographical distribution of *Hedysarum* must be made, properly relating our new plant to those of the Old World. Since its discovery, the new plant has received intermittent attention with the view to determining its relationships and probable position in *Hedysarum* as a whole. To elucidate facts of relationship, distribution and speciation, and

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in order to present a coördinated picture of the genus as it occurs in North America south of the Yukon Territory and Alaska, a rather detailed consideration of *Hedysarum* has been necessary. The Yukon Territory and Alaska have been excluded from the present treatment because much of the material which ought to be studied is in the hands of Dr. Eric Hultén in Sweden and its return to America must await the termination of the present war. There are no questions involving name-priority which would be affected by specific names based on plants from this area.

De Candolle[1] in his monumental work upon the Leguminosae used, in part, muricate or glochidiate processes on the fruits to characterize section *Echinolobium* of *Hedysarum* and to separate it from the only other section recognized, *Leiolobium*. The two sections were clarified in his Prodromus[2] by the actual listing of the species belonging to each. That this classification was drawn along artificial lines apparently was first recognized by Basiner,[3] who reclassified the genus by using an entirely new set of characters. The essential features of Basiner's treatment have been accepted and used by Boissier[4] and more recently by Fedtschenko[5] in his world-wide monograph of the genus. The latter work[6] has been the most valuable single reference during the course of the present study, but the treatment of American plants is not satisfactory and reflects, perhaps, an inadequacy of material upon which the monographer based his decisions regarding our species. All the American plants were placed by Fedtschenko in "subtribe" *Gamotion*, which supposedly contained only those species with at least the lower stipules united. Actually, of the two separable groups of species found in America, one has the lower stipules frequently partially free and those above often entirely free, the other has the lower stipules always united and the upper somewhat united or in rare instances nearly free. On the basis of united or free stipules alone, some of our plants would fall into "subtribe" *Eleutherotion* where they obviously do not

[1] Mem. Legumin. 345 (1825).

[2] Prod. Syst. Nat. **2**: 340–44 (1825).

[3] Mem. Acad. Petrop. **6**: 45–97 (1846).

[4] Fl. Orientalis **2**: 511–25 (1872).

[5] Acta Hort. Petrop. **19**: 185–325 (1902).

[6] I am indebted to Mr. F. J. Whitefield, one of my colleagues in the Society of Fellows, for translating several passages from the Russian.

belong. In view of this fact, it appears that the use of this stipule-character, without others to support it, leads to a somewhat artificial division of *Hedysarum,* at least in so far as the American species are concerned.

Plants of *Hedysarum* in North America are divisable into two natural groups. One, which fits into section *Obscura* of Fedtschenko, has prominently veined leaflets; articles of the loment wing-margined, surface reticulations or areolae of the articles nearly as broad as long; unequal calyx-teeth which are much shorter than the tube, and linear wing-auricles which are united under the standard and equal or exceed the claw of the wings in length. In this group belong *H. alpinum, H. occidentale* and *H. sulphurescens.* In the other group, which does not fit clearly into any of the published subdivisions of the genus, the leaflet-veins are hidden; the articles of the loments are wingless, surface reticulations or areolae are transversely oblong to rectangular, hence much longer than broad; the nearly equal calyx-teeth are linear-subulate and longer than the tube; and the wing-auricles are free, short, broad and less than a third the length of the wing-claw. Here I place *H. boreale, H. Mackenzii* and *H. gremiale.* The characters which have been used to separate these two groups are surprisingly definite and have stood the test of dozens of flower-dissections in American material. It doubtless is true that this subdivision can be employed in classifying certain Asiatic species of *Hedysarum,* as a cursory examination of some of them has indicated, but it is not my purpose to so extend the present investigation.

As indicated above, *H. boreale, H. Mackenzii* and *H. gremiale* are not well-placed in any of the established subdivisions of *Hedysarum,* but according to the treatment of Fedtschenko they must be referred to section *Multicaulia.* Into this section both spiny-fruited and spineless-fruited species are admitted. That species with both types of fruit are sufficiently related to be placed in the same section of *Hedysarum* appears to be in accord with the facts, for my own studies indicate that *H. gremiale* is more nearly related to *H. boreale* var. *cinerascens* than to any spiny- or setose-fruited species from Africa, Europe or Asia. It must be concluded, therefore, that the discovery of a setose-fruited species of *Hedysarum* in America does not mean that

there has been a recent genetical connection between this species and those of the Old World, but that this striking feature of the loment has probably arisen independently in America from forms without spiny fruits. Such a supposition is supported to some extent by the fact that occasional plants of *H. boreale* var. *cinerascens* tend to have muricate reticulations on the loment-segment over the seed, and, in at least one case (*Tweedy* no. 132 from the Tongue River in Wyoming), short but definite nubbin-like spines have been developed.

I am indebted to the curators of herbaria in the following institutions who have loaned material or made facilities available for my use: Gray Herbarium of Harvard University (G); Forest Service, U. S. Department of Agriculture (FS); North Dakota Agricultural College (NDA); New York Botanical Garden (NY); U. S. National Museum (US). Dr. Theodor Just of the University of Notre Dame has supplied pertinent information concerning some of Greene's types. Cited collections followed by the symbol (R) are in my own herbarium.

Synopsis of the genus Hedysarum L. in North America, excepting Alaska and the Yukon Territory

Herbaceous perennials; stems several to numerous from a ligneous root, decumbent to erect, terete, more or less longitudinally grooved, usually appressed-pubescent at least above, often densely so; leaves odd-pinnate, petiolate, leaflets nearly sessile, often apiculate, mostly puncticulate above; stipules united or sometimes free, chartaceous; inflorescence racemose, axillary, peduncled; flowers erect to reflexed, pink to purple, yellowish or white; calyx bracteolate, campanulate, five-toothed, pubscent; corolla glabrous, wings and standard shorter than the keel; stamens diadelphous (9 & 1), included; fruit a loment with elliptical to suborbicular articles; single-seeded articles pubescent or glabrous, areolate, wing-margined or the wings absent; loments usually stipitate.

Key to the Species

a. Auricles of the wings united, linear, equaling or nearly equaling the claw; calyx-teeth markedly unequal, upper nearly triangular; articles of loment wing-margined, areolae about as broad as long; leaflets conspicuously veined.

b. Articles of the loment 3.5–5 mm. broad, narrowly wing-margined, nearly orbicular to slightly oblong; flowers less than 18 mm. long; leaflets mostly oblong to narrowly oblong, 4–7 (–10) mm. wide
1. American varieties of *H. alpinum.*

b. Articles of the loment 6–13 mm. broad, conspicuously wing-margined, elliptical to broadly oblong; flowers at least 16 mm. long or if shorter then sulphur-yellow; leaflets mostly ovate to ovate-lanceolate, 6–14 (–20) mm. wide.

c. Flowers sulphur-yellow, 15–18 mm. long; leaflets glabrous above; loments glabrous; keel truncate ..... 2. *H. sulphurescens.*

c. Flowers reddish-purple, 16–20 mm. long; leaflets usually pubescent above; loments pubescent or very rarely glabrous; keel rounded .... 3. *H. occidentale.*

a. Auricles of the wings not united, blunt, much shorter than the claw; calyx-teeth nearly equal, linear-subulate; articles of the loment wingless, areolae transversely elongated; leaflet-veins hidden.

d. Articles of the loment covered with setae; loments divaricate; leaflets pubescent on both sides .... 4. *H. gremiale.*

d. Articles of the loment free of setae; loments divaricate to pendent; leaflets glabrous above or pubescent on both surfaces.

e. Inflorescence elongated; stems branched above, 2–6 dm. high; stipules dark brown; leaflets pubescent on both surfaces or glabrous above, usually dull slate-colored above; flowers 12–19 mm. long; nodes of the loment narrow, less than half as broad as the articles; articles 2–5 .... 5. *H. boreale.*

e. Inflorescence congested; stems usually unbranched above, 1–3.5 dm. high; stipules whitish-translucent, brown-streaked; leaflets green and glabrous above, rarely slightly pubescent; flowers 18–21 mm. long; nodes of the loment more than half as broad as the articles; articles 4–8 ....6. *H. Mackenzii.*

1. American Varieties of H. alpinum. Herbaceous perennial, stems numerous, terete, longitudinally grooved, branched above, sparsely appressed-pubescent, 2–7 dm. high; stipules connate, brown, 5–15 mm. long, lower large and obtuse, upper acute; leaves petiolate, 6–15 cm. long; leaflets 15–21, glabrous and obscurely puncticulate above, sparsely pubescent (particularly along mid-vein and margins) below, prominently veined, broadly lanceolate to oblong, usually obtuse, rarely nearly acute, apiculate, 10–25 mm. long, 5–10 mm. wide; inflorescence racemose, elongated, often somewhat secund; flowers deflexed, 12–18 mm. long, reddish-purple; calyx pubescent, teeth unequal, 1–2 mm. long, shorter than the tube, upper short and triangular, lower narrower and longer; standard broadly spatulate to obovate, emarginate, 11–14 mm. long; wings narrowly oblong to linear, blunt, 10–13 mm. long, about 2 mm. wide, claw 2–3 mm. long, wing-auricles linear, united beneath standard, equaling the claw;

loments mostly stipitate, glabrous to appressed-pubescent, pendent; articles 2–5, rarely one, 5–7 mm. long, 3.5–5 mm. wide, suborbicular to slightly longer than broad, wing-margined; areolae mostly polygonal, nearly as broad as long.

Key to the American Varieties of H. alpinum L.

Loments glabrous to very sparingly pubescent along the margins.
  Flowers 12–15 mm. long; inflorescence elongated; stems nearly erect, 3–5 dm. high .... 1a. var. *americanum*.
  Flowers 15–18 mm. long; inflorescence subcapitate to somewhat elongated; stems decumbent, 2–4 (–5) dm. high 1b. var. *grandiflorum*.
Loments pubescent on both surfaces, rarely glabrate .... 1c. var. *philoscia*.

1a. Var. americanum Michx. ex Pursh, Fl. Am. Sept. **2:** (1816); Fernald in Rhodora **28:** 216 (1926); Raup in Contrib. Arn. Arb. **6:** 181 (1934); Bull. Nat. Mus. Can. **74:** 148 (1935). *H. alpinum americanum* Michx., Fl. Bor.-Am. **2:** 74 (1803). *H. alpinum* sensu Marie-Victorin, Fl. Laurent. 352 (1935), non L. *H. alpinum* subsp. *americanum* Fedtsch. in Acta Hort. Petrop. **19:** 255 (1902) in part. *H. alpinum* var. *americanum* f. *albiflorum* Fernald in Rhodora **35:** 275 (1933). *H. americanum* Britt. in Mem. Torr. Bot. Club **5:** 201 (1894); Britt. and Brown, Ill. Fl. **2:** 311 (1897); Rydberg, Fl. Rky. Mts. adj. Plains 524 (1917); Fl. Pr. Pl. Cent. N. Am. 487 (1932). *H. boreale* sensu De Candolle, Prod. Syst. Nat. Veg. **2:** 343 (1825) in part; Hooker, Fl. Bor.-Am. **1:** 155 (1834); Torrey and Gray, Fl. N. Am. **1:** 356 (1838); Wood, Classbook Bot. ed. 2, 230 (1847); Gray, Man. ed. 2, 98 (1856); Provancher, Fl. Canad. **1:** 151 (1862); Stevens, Fl. Plants, 348 (1910); Henry, Fl. So. Brit. Columb. 192 (1915); non Nuttall.—Newfoundland to northern Maine and Vermont; Manitoba to British Columbia and probably Alaska. Newfoundland: Bard Harbor Hill, Highlands of St. John, Aug., 1925, *Fernald & Long 28627* (G); Bishop Falls, valley of Exploits River, July, 1911, *Fernald, Wiegand & Darlington 5800* (G); Grand Falls, valley of Exploits River, July, 1911, *Fernald, Wiegand & Darlington 5798* (G). Quebec: between Mont Louis and Rivière à Pierre, Aug., 1923, *Fernald & Smith 25875* (G); Gulf of St. Lawrence, east of Marten River, Gaspé Co., July, 1922, *Fernald & Pease 25171* (G); St. John River, Gaspé Co., Aug., 1904, *Collins, Fernald & Pease* s. n. (G); Tourelle, Gaspé Co., July, 1924, *Pierce & Hodge 7a* (G); Bic, Rimouski Co., July, 1904, *Collins & Fernald* s. n. (G); Aug., 1927, *Rousseau 26823* (G); Renard River, Anticosti Island, Aug., 1927, *Marie-Victorin & Rolland-Germain 27354* (G); Natiskotek River, Anticosti Island, Aug., 1927, *Marie-Victorin & Rolland-Germain 27356* (G); between Baldé and Baie des Chaleurs, Bonaventure Co., Aug., 1904, *Collins, Fernald*

& Pease s. n. (G); Lake St. Jean, July, 1921, *Marie-Victorin* s. n. (G). NEW BRUNSWICK: Gorge of the Aroostook River, Victoria Co., Aug., 1909, *Fernald 1962* (G); July, 1902, *Williams, Collins & Fernald* s. n. (G); Connors, St. John River, July, 1903, *Pease 2262* (G). MAINE: St. John River, St. Francis, July, 1932, *Pease & Goodale 67773* (G); Aug., 1893, *Fernald 26* (G); Fort Fairfield, July, 1902, *Williams, Collins & Fernald* s. n. (G); Fort Kent, July, 1908, *Mackenzie 3536* (NY). VERMONT: Willoughby, July, 1887, *E. & C. E. Faxon* s. n. (G); Aug., 1874, *Congdon* s. n. (G); Smuggler's Notch, Mt. Mansfield, July, 1894, *Eggleston* s. n. (G, NY); Aug., 1877, *E. & C. E. Faxon* s.n. (G); July & Aug., 1877, *Pringle* s. n. (G). MANITOBA: 6 miles east of Forest, June, 1906, *Macoun & Heriot 70783* (G). SASKATCHEWAN: 30 miles east of Touchwood, July, 1906, *Macoun & Heriot 70784* (G); Duck Lake, July, 1913, *Johnson 1375* (NY). ALBERTA: Kootenai Plains, North Branch Saskatchewan River, June, 1908, *Brown 946* (G, NY); Peace Point, Wood Buffalo Park, Aug., 1928, *Raup 2803* (G); Government Hay Camp district, Wood Buffalo Park, Aug., 1928, *Raup 2807* (G); Water Coulee, near Rosedale, June, 1915, *Moodie 948* (G.); Calgary, June, 1903, *Barber 240 & 262* (G.); near Banff, Aug., 1900, *Prince* s. n. (G.); July, 1897, *Van Brunt 20* (NY); Cypress Hills, June, 1894, *Macoun 4534* (G). BRITISH COLUMBIA: vicinity of Hudson Hope, June, 1932, *Raup & Abbe 3626* (G).

1b. Var **grandiflorum,** var. nov. Herba perennis; caulibus decumbentibus, 2–4 (–5) dm. longis; floribus purpurascentibus, 15–18 (–19) mm. longis.—*H. alpinum* sensu Fernald in RHODORA **13:** 119 & 129 (1911); ibid. **28:** 216 (1926); ibid. **35:** 275 (1933); Raup in Contrib. Arn. Arb. **6:** 181 (1934); non L. *H. alpinum* var. *americanum* sensu Ostenfeld in Vidensk. Selsk. Skrift. I Klasse, no. 8, 55 (1909), non Michx. ex Pursh.—Labrador, Newfoundland, northern Alberta and British Columbia. LABRADOR: Forteau, 1870, *S. R. Butter* s. n. (G). NEWFOUNDLAND: Port à Port, July, 1921, *Mackenzie & Griscom 10332* (G, US); Table Mountain, region of Port à Port Bay, July, 1914, *Fernald & St. John 10849* (G); Cook Point, Pistolet Bay, July, 1925, *Fernald & Gilbert 28622* (G); Anse aux Sauvages, Pistolet Bay, Aug. 11, 1925, *M. L. Fernald, K. M. Wiegand & Bayard Long 28625* (G, TYPE); west of Big Brook, Straits of Belle Isle, *Long & Gilbert 28620* (G); Sandy Cove, Straits of Belle Isle, Aug., 1924, *Fernald, Long & Dunbar 26810* (G); Killdevil, Bonne Bay, Aug., 1929, *Fernald, Long & Fogg 1835* (G); Eastern Point, region of St. John Bay, July, 1929, *Fernald, Long & Fogg 1833* (G). ALBERTA: head of Malique Lake, July, 1908, *Brown 1218* (G, NY); Cataract Cr., headwaters of the Saskatchewan and Athabasca Rivers, Aug., 1908, *Brown 1452* (G); head of Smoky

River, Aug., 1911, *Riley 36* (G). British Columbia: Mt. Selwyn, July, 1932, *Raup & Abbe 3967 & 4091* (G).

1c. Var. **philoscia** (A. Nels.) comb. nov. *H. philoscia* A. Nelson in Proc. Biol. Soc. Wash. **15:** 185 (1902); Coulter and Nelson, Man. Bot. Cent. Rky. Mts. 300 (1909). *H. boreale* sensu Rydb., Fl. Rky. Mts. adj. Plains 524 (1917); Fl. Pr. Plains Cent. N. Am. 487 (1932); non Nuttall.—Saskatchewan and Alberta to South Dakota and Wyoming. Saskatchewan: without locality, 1858, *E. Bourgeau* s. n. (G, NY). Alberta: Fort Saskatchewan, July, 1938, *Turner 58 & 59* (G). South Dakota: Rochford, Black Hills, July, 1892, *Rydberg 640* (G); Black Hills, July, 1872, *Greene 13* (NY); near Custer Peak, Lawrence Co., June, 1929, *Palmer 37554* (G); Deerfield, Pennington Co., June, 1929, *Palmer 37509* (G). Wyoming: Boyd, Weston Co., July, 1910, *A. Nelson 9436* (G); Willow Creek, Albany Co., July, 1897, *A. Nelson 3367* (G); Crow Creek, Albany Co., Aug., 1903, *A. Nelson 8955* (G); Laramie Hills, Albany Co., July, 1901, *E. Nelson 622* (G, NY).

In eastern Asia, as in America, there are several phases and varieties of *H. alpinum.* The exact application of Linnaeus' name to Siberian material, except in the broad sense, has not been attempted in the present study. It is evident from a careful examination of Siberian specimens of *H. alpinum* in the Gray Herbarium and in the United States National Herbarium, that the plants heretofore passing as *H. boreale* in such works as Torrey and Gray's Flora[1] and Gray's Manual,[2] and as *H. americanum* in Britton and Brown's Flora[3] and Rydberg's Flora[4] are not specifically distinct from those of eastern Asia. However, the North American plants do differ in certain minor ways and should be considered as separate varieties of a wide-ranging species, *H. alpinum,* which extends from Asia across the north to Newfoundland, Gaspé and Maine and southward along the mountains of western America. Such a treatment indicates clearly the relationships of our plants with those of Asia, and at the same time shows that the American plants have certain special characteristics which are not possessed by those of the Old World. The differences separating the Old World plants from those of the New, particularly those emphasized by Hooker,[5] are at best

[1] Fl. N. Am. **1:** 356 (1838).

[2] Robinson and Fernald in Gray's Manual 7th. ed. 518 (1908).

[3] Ill. Fl. **2:** 311 (1897).

[4] Fl. Rky. Mts. adj. Plains 524 (1917).

[5] Fl. Bor.-Am. **1:** 155 (1834).

only trivial. Certainly the actual differences are not of sufficient importance to justify specific segregation and, in my opinion, it is a mistake to obscure the natural relationships of our plants by giving them a separate specific epithet. The misapplication of the name *H. boreale* is dealt with under that species.

H. alpinum in America has three geographic varieties which are very closely related, but which have certain characteristics peculiar to themselves. Variety *philoscia* is very similar to var. *americanum* except for its densely pubescent instead of glabrous fruits. This difference is not absolute, for there are specimens with fruits pubescent along the margins or even with a very few trichomes along the edges of the flat surfaces of the loments which I have referred to var. *americanum*. Plants of the latter type are apparently of rare occurrence, but they indicate that intermediates between the two varieties actually exist and that attempts to establish either as a distinct species should be regarded with suspicion. Variety *grandiflorum* is a more dwarfed, larger-flowered plant than its nearly related var. *americanum*, and the two are usually quite easily distinguished, but here again, as far as herbarium material shows, there is a gradual transition from one to the other. Variety *grandiflorum* inhabits the headlands of Newfoundland and barrens of northern Canada, while var. *americanum* ranges southward in more favorable habitats. Their most distinctive characters have been set forth in the key above.

2. H. SULPHURESCENS Rydberg. Herbaceous perennial, stems several to numerous from a ligneous root, shallowly furrowed longitudinally, branched above, appressed-pubescent, 2–6 dm. high; stipules united, brown, chartaceous, lower obtuse, 1–1.5 cm. long, upper acute to acuminate, reduced; leaves petiolate, 8–12 cm. long; leaflets 9–17, elliptical to ovate-oblong, usually apiculate, conspicuously veined, sparsely pubescent below, glabrous and puncticulate above, 15–30 (–40) mm. long, 5–10 (–15) mm. wide; inflorescence axillary, racemose, elongated; flowers pendent, ochroleucous to yellow, 15–18 mm. long; calyx pubescent, teeth unequal, shorter than tube, 1–3 mm. long, upper shorter and broader than the lower; standard obovate-cuneate, emarginate, 12–14 mm. long, 6.5–8 mm. wide; wings obtuse, 12–14 mm. long, 2.5–3 mm. wide, wing-auricles linear, united under standard, equaling the claw, 3–3.5 mm. long; keel sharply truncate; loments pendent, stipitate, articles 1–4, conspicuously wing-margined,

glabrous, asymetrically elliptical, 8–12 (15) mm. long, 6–8 (9) mm. wide; reticulations not raised, polygonal.—Bull. Torr. Bot. Club **24:** 251 (1897); Mem. New York Bot. Gard. **1:** 257 (1900); Piper in Contrib. U. S. Nat. Herb. **11:** 367 (1906); Coulter and Nelson, Man. Bot. Cent. Rky. Mts. 300 (1909); Rydberg, Fl. Rky. Mts. adj. Plains 523 (1917). *H. flavescens* Coult. and Fisch., Bot. Gaz. **18:** 300 (1893), non *H. flavescens* Regel and Schmalh. ex Regel in Bull. Soc. Sci. Moscow **34:** 21 (1882). *H. boreale* Nutt. var *flavescens* (Coult. and Fisch.) Fedtsch. in Bull. Herb. Boiss. **7:** 256 (1899). *H. boreale* Nutt. var. *albiflorum* Macoun, Cat. Canad. Pl. **1:** 510 (1884). *H. albiflorum* (Macoun) Fedtsch. in Acta Hort. Petrop. **19:** 252 (1902). *H. boreale* Nutt. var. *leucanthum* sensu M. E. Jones in Proc. Calif. Acad. Sci. **5:** 677 (1895), non *H. Mackenzii* Richards. var. *leucanthum* Greene, Pitt. **2:** 294 (1892).—Alberta and British Columbia to Washington, Idaho and Wyoming. ALBERTA: Pipestone Valley, July, 1906, *Brown 425* (G); Bow River Valley, June, 1906, *Brown 127* (G); Lake Louise, Aug., 1904, *Edith Farr* s. n. (G); between Lake Louise and Lake Louise Station, Sept., 1927, *Eggleston 21810* (US); Laggan, July, 1904, *J. Macoun* s. n. (G); vicinity of Banff, June–July, 1899, *McCalla 2140* (US). BRITISH COLUMBIA: Burgess Trail near Field, July, 1906, *Brown 537* (G); Sept., 1904, *Shaw 591* (G); Crows' Nest Pass, July, 1883, *Dawsan 63* (G); Kananaskis, June, 1885, *J. Macoun* (G, ISOTYPE of *H. boreale* var. *albiflorum*). MONTANA: upper Marias Pass, Aug., 1883, *Canby 93* (G); McDonald's Peak, Mission Range, July, 1883, *Canby 90* (G); Cutbank Creek, Glacier Nat. Park, July, 1934, *G. N. Jones 5425, 5438* and *5513* (G); Mt. Haggin, near Anaconda, July, 1915, *M. E. Jones* s. n. (G); Bozeman, July, 1895, *Shear 5269* (US); Bridger Mts., Gallatin Co., Aug., 1902, *W. W. Jones* (G); Baldy Mountain, Park Co., June, 1912, *Eggleston 8079* (G); Pioneer, July, 1898, *J. K. Uhl* s. n. (G, NDA); Beartooth Mts., 17 miles southwest of Red Lodge, Carbon Co., July, 1939, *Rollins & Muñoz 2828* (G); West Fork of Sun River, Lewis and Clark Nat. For., Aug., 1912, *Saunders 174* (FS); north slope of Pryor Mt., Beartooth Nat. For., June, 1926, *Williamson 2* (FS). WYOMING: Little Tongue River Canyon, Big Horn Mts., Sheridan Co., June, 1936, *L. & R. Williams 3112* (G); 20 mi. west of Dayton, Sheridan Co., July, 1935, *L. Williams 2364* (G); Beartooth Butte, Park Co., Aug., 1937, *L. & R. Williams 3767* (G); near Cody, Yellowstone Nat. Park, July, 1930, *Churchill* s. n. (G); Wraith Falls, Yellowstone Nat. Park, July, 1899, *A. & E. Nelson 5706* (G). IDAHO: south end of Lake Pend d'Oreille, July, 1892, *Sandberg, MacDougal & Heller 748* (G); Targhee Nat. For., Aug., 1911, *Willey 161* (FS). WASHINGTON: near Winthrop, Okanogan Co., July, 1934, *Thompson 10913* (G);

road to Salmon Meadows, Okanogan Co., June, 1931, *Thompson 7024* (G).

Fedtschenko[1] expressed doubt concerning the ultimate validity of *H. sulphurescens* (*H. albiflorum*) as a specific entity, stating that it was very close to *H. alpinum* var. *japonicum* and an undesignated variety of *H. obscurum*. Recently, Hara[2] named var. *japonicum*, in the sense of Fedtschenko, as a species, which seems to indicate that the relationship is not as close as originally supposed. A careful study of the Asiatic plants referred to, shows that they are in the same species-group, but that they are not conspecific with the American plants. Our plants belong to the "*alpinum*" group, but are actually most closely related to *H. occidentale* on account of the large, widely wing-margined loments. Besides having yellowish instead of reddish-purple flowers, *H. sulphurescens* differs from *H. occidentale* in having glabrous instead of pubescent fruits, smaller flowers and a more sharply angled truncate keel. These two species probably had a common origin, but in my opinion, they have now developed differentiating characters which are constant enough to merit for each the rank of a species. *H. sulphurescens* occupies a unified phytogeographical area in the northern Rocky Mountains and adjacent ranges.

3. H. occidentale Greene. Herbaceous perennial, stems several to numerous from a ligneous root, longitudinally furrowed, pubescent, branched above, 3–7 dm. high; stipules brown, chartaceous, united, fragile, lower obtuse, upper acuminate; leaves petiolate to nearly sessile, 8–12 cm. long; leaflets 11–19, ovate, elliptical or broadly oblong, apiculate, sparsely pubescent on both surfaces or rarely glabrous above, puncticulate above, conspicuously veined, 12–25 (–30) mm. long, 7–14 mm. wide; inflorescence racemose, axillary, elongated, 6–13 cm. long; flowers pendent, reddish-purple, 16–20 mm. long; calyx pubescent, teeth unequal, 1–3.5 mm. long, upper short, triangular, lower nearly subulate, shorter than the tube; standard obovate-spatulate, emarginate, 13–15 mm. long, 6.5–7.5 mm. wide at widest point; wings 13–15 mm. long, 2–3 mm. wide, linear-oblong, wing-auricles united under the standard, linear, equalling the claw, 3–4 mm. long; loments pendent, stipitate; articles 1–4, elliptical, conspicuously wing-margined, pubescent or rarely glabrous, 9–14 mm. long, 7–13 mm. wide, reticulations polygonal.—Pitt. **3:** 19

[1] Fedtschenko, op. cit. p. 253.

[2] Journ. Jap. Bot. **15:** 52 (1939).

(1896); Piper in Contrib. U. S. Nat. Herb. **11:** 366 (1906); Piper and Beattie, Fl. Northw. Coast 225 (1915); G. N. Jones in Univ. Wash. Pub. Biol. **5:** 188 (1936). *H. marginatum* Greene, Pitt. **4:** 138 (1900); Rydberg, Fl. Colo. 215 (1906); Fl. Rky. Mts. adj. Plains 524 (1917); Coulter and Nelson, Man. Bot. Cent. Rky. Mts. 300 (1909). *H. uintahense* A. Nelson in Proc. Biol. Soc. Wash. **15:** 186 (1902); Coulter and Nelson, op. cit. p. 300. *H. lancifolium* Rydb. in Mem. New York Bot. Gard. **1:** 256 (1900); Fl. Rky. Mts. adj. Plains 524 (1917).—Washington to Montana, Colorado and Utah. Montana: Moser Mt., Flathead Nat. For., Aug., 1925, *Kirkwood 2187* (G, NY); Thompson Falls, Aug., 1909, *Butler 5058* (NY); Jocko Range, Aug., 1880, *S. Watson 95* (G); near Gunsight Lookout Station, Flathead Nat. For. July, 1928, *Liebig 303* (FS); West Fork Teton River, Lewis and Clark Nat. For., Aug., 1921, *Lane D2–3* (FS). Wyoming: headwaters of Clear Creek and Crazy Woman Creek, Big Horn Mts., July–Aug., 1900, *Tweedy 3193* (NY); Soldier's Park, Big Horn Mts., Aug., 1898, *T. A. Williams* s. n. (US); on the Red Grade near the top, eastern slope of the Big Horn Mts., June, 1934, *Rollins 503* (G, NY); Teton Pass, July, 1920, *E. B. & L. B. Payson 2096* (G, NY); July, 1901, *Merrill & Wilcox 977* (G, NY); Two-gwo-tee Pass, July, 1932, *L. Williams 955* (G); Mt. Wagner, southeast of Smoot, Aug., 1923, *Payson & Armstrong 3749* (G); Evanston, Uinta Co., June, 1900, *A. Nelson 7198* (G, NY, isotypes of *H. uintahense*); near Big Muddy Creek, between Fort Bridger and Evanston, June, 1938, *Rollins 2323* (G); Ashley Nat. For., Uinta Co., June, 1924, *Kane 6* (FS). Utah: near Mill Creek, Summit Co., July, 1926, *E. B. & L. B. Payson 4881* (G, NY). Colorado: White River Nat. For., June–July, 1910, *Reynoldson 81* (FS); 6 miles northwest of the Rio Grande Reservoir, Hinsdale Co., Aug., 1936, *Rollins 1503* (G, NY); Pagosa Springs, July, 1899, *Baker 429* (G, NY); near La Plata, July, 1898, *Baker, Earle & Tracy 464* (G, NY); Silverton, Aug., 1897, *Shear 5227* (NY); foot of Mt. Hesperus, La Plata Mts., Aug., 1892, *Eastwood* s. n. (NY); Rio Grande Nat. For., July, 1924, *Lister 75* (FS). Idaho: hills southeast of Victor, Teton Co., July, 1920, *E. B. & L. B. Payson 2167* (G, NY); Caribou Mt., Bonneville Co., July, 1923, *Payson & Armstrong 3538* (G); ridges south of Wiesner's Peak, July, 1895, *Leiberg 1366* (NY); divide between St. Joe and Clearwater River's, July, 1895, *Leiberg 1213* (G, NY); Waterfall Canyon, Targhee Nat. For., July, 1929, *Richwine 4* (FS); head of Georgetown Canyon, Caribou Nat. For., June, 1926, *Phinney 89* (FS). Washington: *Olympic Mts.:* without definite locality, July, 1890, *Henderson 1850* (G); 1889, *Grant 156* (G); Aug., 1895, *Piper 2227* (US); June, 1900, *Elmer 2529* (US); Mount Angeles,

Aug., 1931, *Thompson 7831* (G); July, 1933, *Thompson 9471* (G, US); Hurricane Ridge, Sept., 1937, *Thompson 14176* (G, US); Blue Mountain, Deer Park Recreational Area, Aug., 1938, *Rollins & Chambers 2693* (G); Bogachiel Ridge, headwaters of the Hoh River, Aug., 1938, *Rollins & Chambers 2704* (G); Mt. Colonial Bob, July, 1931, *Thompson 9968* (G, US); Aug., 1933, *Thompson 9968* (G); Mt. Baldy, July, 1897, *Lamb 1318* (US).

H. occidentale is most nearly related to *H. sulphurescens,* from which it differs in having reddish-purple instead of light yellow flowers, usually pubescent instead of glabrous fruits and more leaflets on each compound leaf. There are 13 to 19 leaflets with pubescent upper surfaces in *H. occidentale*, whereas in *H. sulphurescens* the 9–15 leaflets are glabrous above. Also, the flowers and fruits of the former are uniformly larger than those of the latter. Both these species are related in a general way to the American varieties of *H. alpinum*, but the very much larger and more broadly winged loment-articles of *H. occidentale* and *H. sulphurescens* are not matched by any other American species of the genus.

The known geographical distribution of *H. occidentale* is of interest because of the total absence of this plant from the intervening area between the Olympic Mountains of western Washington and the mountains of northern Idaho. Many other plants of boreal dispersion have a similar distribution. Doubtless a continuous range once existed to the northward, but such a continuity could hardly have survived the glacial activity which is known to have taken place in the area. This explanation presupposes a preglacial migration of *H. occidentale* from the north to the Olympic Mountains on the one hand and to the Rocky Mountains on the other. Plants from the two areas are alike in all details, hence there is no question about their belonging to the same species. *H. marginatum,* described from Colorado, and *H. unitahense,* described from Wyoming, do not differ in any significant way from *H. occidentale*. Indeed, Nelson,[1] in his citation of specimens accompanying the original description of *H. uintahense,* mentioned a Henderson specimen from the Olympic Mountains of Washington as probably belonging to the species he was describing. *H. lancifolium* Rydberg appears to be a leaf-form of *H. occidentale*. The actual type was not found at the New York

[1] Proc. Biol. Soc. Wash. **15**: 156 (1902).

Botanical Garden, but specimens annotated by Rydberg and plants coming from the type-locality have proved to be narrow-leaved forms of the latter species.

There are several minor variations in *H. occidentale*, but they are mostly quantitative and are not correlated with each other or with any phytogeographical area. For example, the length of the calyx-teeth varies a millimeter or more, the size and to some extent the shape of the leaflets vary, and the total height of the plants varies with habitat and altitude. The loments are nearly always pubescent, but an occasional collection from Montana or Washington may have glabrous fruits. There is a slight difference, in some cases, as to the way in which the trichomes are disposed upon the loment. Often they are appressed, but in a number of collections the hairs are spreading and may even be slightly crooked. These variations, in so far as I am able to discern, are not of any real significance as far as classification is concerned, but might easily have resulted from the differences in habitat and climatic conditions under which the plants grew.

4. H. **gremiale,** sp. nov. (Plate 597). Deep-rooted, perennial herb; stems numerous from a ligneous caudex, greenish, ascending, branched, densely pubescent with small simple appressed trichomes, terete, 3–6 dm. high; leaves odd-pinnate, densely appressed-pubescent; leaflets 5–13, oblong to elliptical, 1–2 cm. long, 5–10 mm. wide, often apiculate; stipules brownish, pubescent, chartaceous, very fragile, lower united, upper nearly free; inflorescence racemose, in fruit 1–1.5 dm. long; flowers numerous, erect, 1–1.5 cm. long; pedicles pubescent, 2–4 mm. long; calyx furnished with two small bracteoles, densely pubescent, calyx-teeth about equal, narrowly subulate, tipped with red, 4–5 mm. long; corolla pink to reddish-purple, drying purplish-pink; standard obovate, emarginate, 12–14 mm. long, about 1 cm. wide; wings about 1 cm. long, 3–3.5 mm. wide, auricles blunt, broad, not united, about 1 mm. long, claw broad, about 2 mm. long; keel blunt, 13–15 mm. long; loments stipitate, articles 1–5, either closely joined or with a connective of variable length, flattened, suborbicular to slightly longer than broad, prominently and loosely reticulate-nerved, rather densely appressed-pubescent, wingless, 6–8 mm. broad; nerves or costae of the articles supporting numerous spine-like or setaceous processes, these purple-tipped, 3–5 mm. long and usually with a few scattered trichomes upon them; articles one-seeded, mature seeds not seen.

Herba perennis multicaulis; caulibus erectis vel adscendentibus pubescentibus, 3–6 dm. altis; foliis imparipinnatis petiolatis; foliolis 5–13, oblongis vel ellipticis undique pubescentibus; stipulis fuscis connatis pubescentibus; inflorescentiis axillaribus racemosis; floribus erectis; calycis subcylindricis, lobis subulatis 4–5 mm. longis; corollis siccatis roseo-purpurascentibus 13–15 mm. longis; leguminibus articulatis stipitatis compressis; articulis suborbicularibus pubescentibus ciliatis reticulato-rugosis 6–8 mm. latis immarginatis in costis setosis vel subspinulosis.—*H. cinerascens* sensu Graham in Ann. Carn. Mus. **26:** 251 (1937) in part, non Rydberg. *H. utahense* sensu Graham, ibid. p. 252 in part, non Rydberg.—Known only from Utah: *Uintah County:* heavy adobe soil in a narrow ravine, 14 miles west of Vernal, Uinta Basin, June 16, 1937, *Reed C. Rollins 1733* (G, type, R, isotype); 18 miles north of Vernal, Uinta Basin, June, 1937, *Rollins 1757a* (G, R); bench west of the Green River, north of the mouth of Sand Wash, Uinta Basin, May, 1933, *Graham 7912* (G, US); Vernal-Manilla road north of Vernal, June 19, 1933, *Graham 8156* (US); Uinta Basin, June, 1912, *Peterson* s. n. (US).

Flowering plants of *H. gremiale* are difficult to distinguish from varieties of *H. boreale* which have both leaflet-surfaces pubescent, but with developing or mature fruits, there is no need for question as to which species one is observing. In the very young stage, fruits of *H. gremiale* do not show any signs of the very marked setae which later appear upon the flattened surfaces. As the fruit enlarges, small tubercles appear at various points along the surface reticulations. Soon these tubercles elongate into peculiar setae or spine-like processess which are sparsely covered with simple trichomes. *H. gremiale* is actually most closely related to *H. boreale* var. *cinerascens,* which it resembles in general habit. Both are pubescent throughout, though *H. gremiale* is much less densely covered with trichomes and less silvery in appearance than *H. boreale* var. *cinerascens.* A further clue to the relationship between these species is the occasional occurrence of very abbreviated tubercles on the loments of *H. boreale* var. *cinerascens.* This suggests a comparatively recent genetical connection between the two.

H. gremiale apparently occurs only locally in the Uinta Basin of northeastern Utah; however, the plants were very abundant in the two places where I observed them. The habitat is in the geologically young foothills of the Uinta Mountains, near the

bottom of the Basin. This limited distribution in a geologically young area points to a recent origin for *H. gremiale.* I should suggest *H. boreale* var. *cinerascens* or some other phase or variety of *H. boreale* as the probable ancestor.

5. H. boreale Nuttall. Herbaceous perennial, stems several to numerous from a ligneous root, terete, longitudinally grooved, pubescent, 2.5–6 dm. high, branched above; stipules brown, chartaceous, triangular with a subulate tip, lower united, upper nearly free; leaves short-petioled, 4–8 cm. long; leaflets 9–13, linear-oblong to nearly elliptical or those of the lower leaves obovate, densely pubescent on both surfaces to glabrous above, puncticulate above, 3–8 mm. wide, 1–2.5 cm. long, obtuse; inflorescence racemose, elongated; bracts brown, subulate, equaling or exceeding the pedicels; flowers erect, numerous, carmine, 12–19 mm. long; calyx pubescent, teeth nearly equal, subulate, 3–5 mm. long, longer than the tube; standard obovate to broadly cuneate, emarginate, 12–17 mm. long, 7–12 mm. wide; wings 10–14 mm. long, 2.5–4 mm. wide; claw broad, 2–3 mm. long, wing-auricle blunt, free, about 1 mm. long; loments pendent to somewhat divaricate, usually stipitate; articles 2–5, orbicular to suborbicular, 5–7 mm. wide, 6–8 mm. long, appressed-pubescent, not wing-margined, flattened, rugose when mature, reticulations transversely elongated.

Key to the Varieties of H. boreale

Flowers 12–16 mm. long, erect or the lower tardily reflexed; inflorescence not interrupted; leaflets 10–15 (–20) mm. long.
  Leaflets glabrous to sparsely pubescent above, articles of the loment rugose, but not deeply wrinkled, short spines never present .... 5a. var. *typicum.*
  Leaflets and stems silvery-canescent throughout, articles of the loment deeply wrinkled over the seed, short tubercles often present.
    Leaflets oblong to broadly linear; pubescence smooth, silvery hairs appressed, less than 1 mm. long .. 5b var. *cinerascens.*
    Leaflets obovate; pubescence shaggy, silvery hairs spreading, about 1.5 mm. long .... 5c. var. *obovatum.*
Flowers 16–19 mm. long, lower reflexed; inflorescence interrupted, leaflets 15–25 (–30) mm. long .... 5d. var. *utahense.*

5a. H. boreale Nuttall, var. **typicum.** *H. boreale* Nutt., Gen. N. Am. Pl. **2:** 110 (1818); Journ. Acad. Sci. Philad. **7:** 19 (1834). *H. Roezlianum* Prantl, Ind. Sem. Hort. Wirceb. 8 (1873) ? *H. carnosulum* Greene, Pitt. **3:** 212 (1897); Rydb., Fl. Colo. 216 (1906); Fl. Rky. Mts. adj Plains 524 (1917). *H. Mackenzii* sensu Rydb. in Mem. N. Y. Bot. Gard. **1:** 257 (1900); Fedtsch. in Acta Hort. Petrop. **19:** 273 (1902) in part, non Richardson. *H.*

pabulare A. Nels. in Proc. Biol. Soc. Wash. **15:** 185 (1902); Rydb., Fl. Colo. 215 (1906); Fl. Rky. Mts. adj. Plains 524 (1917); Coulter and Nelson, Man. Bot. Cent. Rky. Mts. 300 (1909); Wooton and Standley in Contrib. U. S. Nat. Herb. **19:** 373 (1915); Tidestrom in Contrib. U. S. Nat. Herb. **25:** 333 (1925). *H. pabulare,* var. *rivulare* L. O. Williams in Ann. Mo. Bot. Gard. **21:** 344 (1934). *H. Mackenzii* Richards., var. *pabulare* Kearney and Peebles in Journ. Wash. Acad. Sci. **29:** 485 (1939). *H. cinerascens* sensu Tidestrom in Contrib. U. S. Nat. Herb. **25:** 333 (1925), non Rydberg. *H. utahense* sensu Graham in Ann. Carneg. Mus. **26:** 252 (1937) in part, non Rydberg.—Alberta to Oklahoma, Arizona and Idaho. ALBERTA: Rosedale Coulee, near Rosedale, July, 1915, *Moodie 1078* (G, NY); Rosedale Trail, near Rosedale, June, 1915, *Moodie 1020* (G); Red Deer Lakes, July, 1879, *Macoun 105* (G). NORTH DAKOTA: Donnybrook, July, 1935, *Stevens & Kluender 132* (G, US); Range 92, Township 149, Dunn Co., June, 1936, *Heidenreich* s. n. (NDA); Sanish, July, 1923, *Stevens* s. n. (NDA); Fort Buford, 1890, *Havard 2 & 3* (NY); Medora, Aug., 1923, *Stevens* s. n. (NDA); June, 1938, *Stevens & Brenkle 38–011* (G). OKLAHOMA: near Shattuck, Ellis Co., June, 1914, *Clifton 3200* (G). MONTANA: North Fork of Bear Cr., Gallatin Nat. For., Gallatin Co., *Whitham 1811* (FS); 1 mile west of Teal Lake, July, 1901, *Spragg 326* (G); Ear Mountain, Lewis and Clark Nat. For., July, 1921, *Butter D3–12* (FS); Jefferson Nat. For., Aug., 1927, *Park 65* (FS). WYOMING: Gilbert Creek, Park Co., July, 1937, *L. & R. Williams 3539* (G, NY, R); Undine Falls, Yellowstone Nat. Park, July, 1899, *A. & E. Nelson 5679* (G); along Snake River, Teton Co., July, 1932, *L. Williams 975* (G, ISOTYPE of *H. pabulare* var. *rivulare*); bars of Gros Ventre River, Teton Co., Aug., 1894, *Nelson 1087* (G); July, 1901, *Merrill & Wilcox 993* (G, NY, US); Bates Creek, Natrona Co., July, 1901, *Goodding 201* (G, US); 20 miles west of Big Piney, Sublette Co., July, 1922, *E. B. & L. B. Payson 2617* (G); 14 miles east of Evanston, Uinta Co., July, 1939, *Rollins & Muñoz 2875* (G, R). COLORADO: Canon City, Aug., 1896, *Shear 3768* (NY); June, 1917, *E. L. Johnston & Hedgecock 638* (G, NY); Trinidad, Aug., 1912, *Beckwith 91* (NY); June, 1917, *E. L. Johnston 617* (G); Trinchera Creek, about 20 miles northwest of Branson, July, 1937, *Rollins 1864* (G, R); Cimarron, Gunnison Co., June, 1901, *Baker 274* (G); mouth of Wolf Creek, White River, Rio Blanco Co., May, 1935, *Graham 9044* (G, US); Paradox, Montrose Co., June, 1912, *Walker 151* (G); Naturita, Montrose Co., May, 1914, *Payson 322* (G); Mancos, June, 1898, *Baker, Earle & Tracy 83* (G); Durango, May, 1916, *Eastwood 5311* (G). NEW MEXICO: near Cimarron, June, 1929, *Mathias 556* (G); Algodones, June, 1887,

Tracy & Evans 139 (NY); Canoncito, Santa Fe Co., June, 1897, *A. & E. Heller 3732* (G); between Gallup and Albuquerque, May, 1931, *McKelvey 2338* (G). Idaho: Clyde, Blaine Co., July, 1916, *Macbride & Payson 3124* (G, NY, US); Warm Springs Ranger Station, Lemhi Nat. For., June, 1928, *Schulze 71* (FS). Utah: Book Cliffs, Uinta Basin, July, 1935, *Graham 9842* (US); Soldier's Summit, 1894, *M. E. Jones 5592* (NY); Bryce Canyon, Garfield Co., July, 1938, *Rollins & Chambers 2453* (G, R); Pleasant Cr., Powell Nat. For., Garfield Co., July, 1915, *Hanks 6* (FS); Millard Co., June, 1938, *Jensen* s. n. (G); Juab, June, 1902, *Goodding 1076* (G); mesa east of Monticello, July, 1911, *Rydberg & Garrett 9203* (NY, US); Convulsion Canyon, Sevier Co., July, 1930, *Albertson 41* (FS); south of Mexican Hat, June, 1930, *Goodman & Hitchcock 1345* (G). Arizona: vicinity of Flagstaff, July, 1898, *MacDougal 214* (G, NDA, NY). Oregon: Hurricane Creek, Wallowa Co., July, 1897, *Sheldon 8628* (G, NY); Aug., 1898, *Cusick 2104* (G); head of North Fork of Imnaha River, Wallowa Co., July, 1928, *Reid 738* (FS).

5b. Var. **cinerascens** (Rydb.),[1] comb. nov. *H. cinerascens* Rydb. in Mem. N. Y. Bot. Gard. **1:** 257 (1900); Coulter and Nelson, Man. Bot. Cent. Rky. Mts. 299 (1909); Rydb., Fl. Rky. Mts. adj. Plains 524 (1917); Fl. Pr. and Plains Cent. N. Am. 487 (1932). *H. canescens* Nuttall in T. & G., Fl. N. Am. **1:** 357 (1838), non *H. canescens* L., Sp. Pl. **2:** 748 (1873). *H. Macquenzii* f. *canescens* Fedtsch. in Acta Hort. Petrop. **19:** 274 (1902). *H. Macquenzii* v. *canescens* Fedtsch., ibid. in index p. 362.—Saskatchewan and Alberta to Wyoming. Saskatchewan: Quappelle, June, 1879, *Macoun* s. n. (NY); Whiteshore Lake, Aug., 1906, *Macoun & Heriot 70786* (NY); Bare Hills, Aug., 1906, *Macoun & Heriot 70785* (G, NY); Moose Jaw, July, 1880, *Macoun* s. n. (G); without locality, 1858, *E. Bourgeau* s. n. (G, NY). Alberta: Cypress Hills, June, 1894, *Macoun 4532* (G); Medicine Hat, May, 1894, *Macoun 4531* (NY); Milk River Ridge, June, 1883, *Dawson* s. n. (G). Without definite locality: Lewis River, Rocky Mts., *Nuttall* (NY, isotype ?); Rocky Mts., *Nuttall* (G, isotype? possibly same as previous collection). Montana: Sec. 28, T. 10 N., R. 10 E., Jefferson Nat. For., June, 1925, *Bouham 25* (FS); Yellowstone River, 1878, *Havard* s. n. (G); Midvale, July, 1903, *Umbach 372* (NY, US); Lima, June, 1895, *Shear 3363* (NY, US); June 29, 1895, *Rydberg 2721* (NY);

[1] There is some question as to whether var. *canescens* Fedtschenko, though based on the illegitimate *H. canescens* Nuttall, should not take precedence over the combination I have made here, because of its possible priority in the varietal category. The fact that the combination *H. Macquenzii*, v. *canescens* was dubiously made only in the index of Fedtschenko's monograph, l. c., makes it almost imperative that the legitimate valid *H. cinerascens* be taken up in order to make the nomenclature of this variety definite and clear.

Livingston, 1901, *Scheuber 222* (NY, US); Sixteen Mile Creek, July, 1883, *Scribner 32* (G); Spanish Creek, Gallatin Co., June, 1901, *Vogel* s. n. (G); Park County, June, 1889, *Tweedy* s. n. (NY). WYOMING: Shirley Basin, Aug., 1908, *A. Nelson 9179* (G, NY); Red Bank, Big Horn Co., July, 1901, *Goodding 332* (G, NY, US); Headwaters of Tongue River, Big Horn Mts., July, 1898, *Tweedy 132* (NY); Dayton-Kane Road, Sheridan Co., June, 1932, *Dickson 250* (FS); Lower Blackrock, Teton Nat. For., *Rosencrans 39* (FS).

5c. Var. **obovatum,** var. nov. Herba perennis argentea pubescentia; foliolis obovatis; pilis ca. 1.5 mm. longis.—Northern NEVADA: Thorpe Creek, east of Lamoille, Elko Co., Humbolt National Forest, July 25, 1928, *Harold H. Price 168* (FS, TYPE).

5d. Var. **utahense** (Rydberg), comb. nov. *H. utahense* Rydberg in Bull. Torr. Bot. Club **34:** 424 (1907); Fl. Rky. Mts. adj. Plains 524 (1917); Tidestrom in Contrib. U. S. Nat. Herb. **25:** 333 (1925). *H. boreale*? sensu Durand. in Journ. Acad. Nat. Sci. Philad. **11:** 162 (1859), non Nuttall. *H. Mackenzii* sensu Watson, Bot. Fortieth Parallel 78 (1871), non Richardson.—Northern UTAH: Wasatch Mts., July, 1869, *Watson 294* (G, NY); Fort Douglas, June, 1906, *Garrett 1798* (G); May, 1908, *Clemens* s. n. (G); vicinity of Salt Lake City, May, 1883, *Leonard 55* (NY, TYPE); Mt. Nebo, Aug., 1922, *Harris c22402* (G); Ogden Canyon, July, 1902, *Pammel & Blackwood 3705* (G); Rock Canyon, near Provo, June, 1925, *Garrett 3324* (G); Lehi, May, 1916, *W. W. Jones 170* (G); Salina Canyon, June, 1894, *M. E. Jones 5319g* (NY); Brigham, May, 1910, *Zundel 193* (NY); between Linder and Pleasant Grove, Utah Co., June, 1917, *Eggleston 13870* (US); South Sink, Garden City, Cache Nat. For., July, 1927, *Craddock 20* (FS).

H. boreale has been widely misunderstood, possibly because of Nuttall's[1] own suggestion that his plant was "H. alpinum ? Mich. Fl. Am. 2. p. 74." Apparently realizing his error, perhaps because he became familiar with the species of Michaux, Nuttall clarified his position by listing[2] one of Wyeth's specimens from the "sources of the Missouri" as "*Hedysarum boreale, H. Mackenzii* of Richardson, not *H. alpinum* of Michaux." Whatever led many authors, including Torrey and Gray,[3] Gray,[4] Britton and Brown[5] and Rydberg,[6] to apply the name *H. boreale* to one or

[1] Gen. N. Am. Pl. **2:** 110 (1818).
[2] Journ. Acad. Sci. Philad. **7:** 19 (1834).
[3] Fl. N. Am. **1:** 356 (1838).
[4] Man. Bot., ed. 2, 98 (1856).
[5] Ill. Fl. **2:** 392 (1913).
[6] Fl. Rky. Mts. adj. Plains 524 (1923).

another of the varieties of *H. alpinum* is not at present entirely clear. Several points brought out by Nuttall in his original description of *H. boreale* such as "stipules . . . subulate," "articulations of the loment . . . rugose," and "calix subulate" could hardly be applied to any of the American varieties of *H. alpinum*. Most suspicious of all, when one attempts to utilize the usual interpretation given in most floras and manuals, is Nuttall's statement of habitat "in arid and denudated soils around Fort Mandan, on the banks of the Missouri." Those familiar with the Fort Mandan region of North Dakota and the usual habitat for any of the varieties of *H. alpinum* are aware that no single species of *Hedysarum* is apt to be found in both habitats. Five collections of *Hedysarum* from North Dakota have been supplied by Dr. O. A. Stevens of the North Dakota Agricultural College for my study. All of these collections, one of which is from Dunn County in the Fort Mandan area, are the same species, *H. boreale*. In recent manuals plants comparable to these have been passing as *H. pabulare* and *H. cinerascens*, or in some instances as *H. Mackenzii*. Durand[1] long ago seems to have been on the right track as to the true identity of *H. boreale* when he noted that, "I cannot but consider *H. boreale* & *H. canescens* of Nuttall, and *H. Mackenzii* of Richardson, as forms of the same species, which it is impossible to separate."

H. boreale is one of those species with several recognizable varieties and numerous variants of less stable character. In several areas in its wide geographic range from Saskatchewan to Oklahoma and Arizona, trends of development are observable. Most prominent, perhaps, are those which have given rise to the large-flowered type found chiefly in northern Utah which Rydberg named *H. utahense* and the silvery-canescent type from northern Wyoming, Montana and adjacent southern Canada named *H. canescens* by Nuttall. Unfortunately, var. *obovatum* is not well enough known for its relationships with other varieties of *H. boreale* to be at all clear. Greene named another variant *H. carnosulum*, but the only points which are at all even measurably different from *H. boreale* var. *typicum* are the shorter stem-internodes and smaller leaves. These, it seems to me, are hardly sufficient to warrant keeping it up even in varietal rank.

[1] Journ. Acad. Sci. Philad. **11**: 162 (1859).

Neither the original publication nor the type, if there be one, of *H. Roezlianum* have been available to me, but Fedtschenko[1] has reproduced Prantl's original diagnosis and notes in their entirety. The description is certainly that of a *Hedysarum* and, in my opinion, *H. boreale* or possibly one of its varieties. *H. Roezlianum* is based upon plants grown in the botanical garden of the University of Würzburg from seeds supplied by Rözl, who supposedly collected them in California. Since the genus *Hedysarum* is not known to occur in California and since Rözl is known to have traveled rather widely[2] in the Great Basin and Rocky Mountain regions, I think it is safe to assume that the seeds came from some locality in these areas.

6. H. Mackenzii Richardson. Perennial; stems several to numerous from a ligneous caudex, mostly simple above, terete, shallowly furrowed above, sparsely appressed-pubescent, 1–4 dm. high; stipules white-translucent with brown streaks, united, tips of the upper free; leaves petiolate, 4–8 cm. long; leaflets 4–6, oblong to broadly lanceolate or nearly elliptical, thick, glabrous to very sparsely pubescent and puncticulate above, appressed-pubescent below, 15–25 mm. long, 4–10 mm. wide, obtuse to acute, not apiculate; inflorescence racemose, subcapitate; flowers 5–12, purple, erect but soon pendent, 18–21 mm. long; bracts subulate, pubescent, broadly scarious-margined; bracteoles linear, 2–3 mm. long; calyx villose, teeth linear-subulate, nearly equal, longer than tube, 3.5–6 mm. long; standard cuneate to broadly spatulate or nearly obovate, emarginate, 15–17 mm. long, 9–11 mm. wide; wings oblong, 14–16 mm. long, 3–4 mm. wide, claw broad, about 3 mm. long, wing-auricles blunt, rounded, free, about 1 mm. long; loments pendent to divaricately ascending, stipitate, 3–8-articled; articles nearly orbicular, not wing-margined, appressed-pubescent, 4–6 mm. wide, 5–8 mm. long, reticulations prominent, transversely elongated.—App. Franklin's Journ. 745 (1823); Hooker, Fl. Bor.-Am. **1:** 155 (1834); Torrey and Gray, Fl. N. Am. **1:** 357 (1838); Basiner in Mem. Acad. Sci. Petrop. **6:** 58 (1846) in part; A. Nelson in Proc. Biol. Soc. Wash. **15:** 184 (1902); Fedtschenko in Acta Hort. Petrop. **19:** 273 (1902) in part; Henry, Fl. So. Brit. Columb. 192 (1915); Rydberg, Fl. Rky. Mts. adj. Plains 524 (1917); Fl. Pr. and Plains Cent. N. Am. 487 (1932) in part; Raup in Contrib. Arn. Arb. **6:** 181 (1934); Bull. Nat. Mus. Can. **74:** 148 (1935). *H. americanum Mackenzii* Britt. in Mem. Torr. Bot. Club. **5:** 202 (1894). Newfoundland and Quebec; Manitoba and northwestward; also

[1] Acta Hort. Petrop. **19:** 324 (1902).

[2] Garten- und Blumenzeit. Hamb. 422 (1874).

eastern Siberia. Without definite locality, presumably the Canadian Arctic, *Richardson* s. n. (G, isotype?). Newfoundland: Green Gardens, Cape St. George, July, 1922, *Mackenzie & Griscom 11005 and 11053* (G). Quebec: Vaureal River, Anticosti Island, July, 1925, *Marie-Victorin et al. 20871* (G). Manitoba: Churchill, Hudson Bay, July–Aug., 1910, *J. M. Macoun* (G). Northwest Territory: Chesterfield, Aug., 1933, *Gardner 434* (G); Bernard Harbour, Aug., 1915, *Johansen 331* (G). Alberta: Calgary, July, 1903, *Barber 211* (G); near Fortress Pass, July, 1927, *Ostheimer 82* (G); Ptarmigan Lakes and vicinity, July, 1906, *Brown 401* (G); Bow River Valley near Banff, June, 1906, *Brown 75* (G); head of Malique Lake, July, 1908, *Brown 1219* (G); 40–60 miles southwest of Banff, July–Aug., 1905, *Clark* s. n. (G); Mt. Temple, Laggan, July, 1907, *Butters & Holway 121* (G); between Salt Mt. and Junction Lake, June, 1928, *Raup 2802* (G). British Columbia: Mt. Selwyn, July, 1932, *Raup & Abbe 3757* (G); vicinity of Hudson Hope, June, 1932, *Raup & Abbe 3603* (G); vicinity of the mouth of Wicked River, July, 1932, *Raup & Abbe 3854* (G); Burgess Trail near Field, July, 1906, *Brown 538* (G); Telegraph Creek, June, 1918, *Walker 1203* (G). Yukon Territory: Herschel Island, Aug., 1934, *Dutilly 235* (G).

H. Mackenzii is a close relative of *H. boreale* Nutt. and might with some propriety be considered a variety of it, but there are some good reasons for keeping the two as separate species. *H. Mackenzii* is an arctic-alpine species which extends, interruptedly, from eastern Siberia to Newfoundland, and southward along the Rocky Mountains in western Canada. On the other hand, *H. boreale* is not a high-mountain species at all, but rather inhabits the low hills of the plains region of southern Canada and the western plains states together with the intermontane basins and lower mountain slopes of the Rocky Mountain Region. *H. Mackenzii* has fewer, larger, more brilliantly colored flowers and a more globular inflorescence than *H. boreale*, in which the flowers are a dull reddish-purple and disposed in an elongated raceme. On the whole, the two species differ considerably in habit and general aspect as well as in a number of technical characters which have been emphasized in the key. Considering the fact that *H. Mackenzii* and *H. alpinum* var. *americanum* (*H. americanum* Britt.) belong to two entirely different sections of the genus, it is almost incredible that Britton should have considered the two to belong to the same species. His combination

H. americanum Mackenzii must have been the result of a very hasty judgment.

PLATE 597. HEDYSARUM GREMIALE Rollins, sp. nov.: FIG. 1, ISOTYPE, × 1/3, from 14 miles west of Vernal, Utah, *Rollins 1733;* FIG. 2, loments, × 3; FIG. 3, upper portion of inflorescence, × 3.

II. SOME SPERMATOPHYTES OF EASTERN NORTH AMERICA

M. L. FERNALD

(PLATES 598–625)

In an attempt to place the flora of the area covered by Gray's *Manual* upon a basis of greater precision it is found necessary to check the treatment of every genus and species. In the present paper notes which have accumulated during the past year are presented. In several cases nomenclatural transfers are necessitated by study of the actual types or of photographs of them purchased with aid of appropriations for research from the Department of Biology of Harvard University. The photographs of types of Linnean species have been received through the coöperation of Mr. Spencer Savage, Assistant Secretary of the Linnean Society of London, and of Dr. John Ramsbottom, Keeper of Botany at the British Museum of Natural History. For those of Lamarck, Desrousseaux and Michaux I am indebted to the always helpful Professor H. Humbert and M. R. Metman of the Muséum National d'Histoire Naturelle of Paris. To all these gentlemen I extend my grateful appreciation.

Some transfers are made from indefinite trinomials (published without clear statement of rank) or of plants originally described as subspecies. Most unfortunately, the term *subspecies,* clearly understood and correctly used by some of the most accurate of Old World systematists, has become debased and confused by a group of relatively inexperienced taxonomists (chiefly in this country) and its incorrect use is being urged by them, in the sense of the long-established term *varietas.* As correctly used the two are by no means of the same rank. The *subspecies* of the best taxonomists is a subdivision of an aggregate-species, *Gesamtart* or *species collectivus,* the subspecies often consisting of

geographic varieties ("races") and by many of us often treated as true species. A clear and concise statement of the true relation of these categories is contained in the Preface (p. vi.) to Hayek's splendidly clear Prodromus Florae Peninsulae Balcanicae, i. in Fedde, Repert. Sp. Nov. Reg. Veg. xxx[1]. (1924). This I reproduce:

I. **Subspecies** . . . , i. e. formae valore systematico magno, quae plerumque facile distingui possunt, quarum origo communis autem formis intermediis vel alio modo patet.
 A. Varietates . . . , i. e. variationes valde distinctae distributione geographica propria.
  a) Subvarietates . . . , variationes similibus characteris ac priores sed aut constantia minore aut distributione geographica minus distincta
   a) formae
. . . , variationes valoris systematici parvi, plerumque sine distributione geographica propria.

As an illustration we may look at Hayek's treatment of the cosmopolitan weed, *Stellaria media* (as it occurs in the Balkans). It is broken by him into three parallel subspecies: subsp. *eumedia*, *pallida* and *neglecta*. These differ in relatively fundamental characters, in which many systematists see true species: subsp. *eumedia* with outer sepals obtuse, petals about equaling calyx, stamens 3–5, styles recurved at apex, with forma *apetala* like it but apetalous; subsp. *pallida* with outer sepals lance-acuminate, petals minute or wanting, stamens 1–3, styles divaricate at base; and subsp. *neglecta*, a robust plant, with petals equaling or exceeding calyx, stamens 10. Subsp. *neglecta*, treated by many students as a good species, has two varieties: var. *macropetala* with stem pilose in lines, the petals longer than calyx; and var. *pubescens* with stem and peduncles densely viscid-puberulent, the petals equaling the densely pubescent sepals. Hayek correctly differentiated between subspecies and varieties. Another illustration of correct use of the terms is in Hackel's monograph of the *Andropogoneae* in DC. Mon. Phan. vi. (1889). Hackel (pp. 383–385) broke the familiar *Andropogon scoparius* Michx., which he considered an aggregate-species, into two subspecies: subsp. *a. genuinus* and subsp. *b. maritimus*. The former, including several subvarieties and forms, is the wide-ranging North American cespitose plant, with each fertile and sessile spikelet accompanied by a pair of plumose pedicels, the latter either with rudiments

or without; the second subspecies, subsp. *maritimus*, has each sessile spikelet accompanied by a single hairy pedicel which terminates in a well developed staminate spikelet. Hackel's *A. scoparius*, subsp. *maritimus* consisted of var. α. *genuinus*, which is *A. maritimus* Chapm., a low and stout stoloniferous plant with solitary culms and reflexed or divergent short leaves, found on the sandy coast of the Gulf of Mexico; and var. β. *divergens* (Anderss.) Hackel, based on a previously unpublished species, *A. divergens* Anderss. in herb., the latter a very tall plant forming dense stools, with prolonged slender ascending leaves, known only in pinelands of Texas. Nash, Hitchcock and all American students of grasses who correctly know these two plants treat them as perfectly distinct species, *A. maritimus* Chapm. and *A. divergens* Anderss. In other words, the term *subspecies*, correctly used by Hayek and by Hackel, covers a taxonomic concept of far greater value than the term *varietas*. A quite similar interpretation will be found to underlie the subspecies and varieties of those masters who have long correctly used these categories in botany; the term *subspecies*, correctly used, is of higher rank than the term variety (*varietas*) as used by the overwhelming majority of outstanding leaders in taxonomy from Linnaeus down. The substitution of the term *subspecies* for *varietas* has no justification in sound taxonomy of plants; and those who so substitute it not only cheapen and obscure the categories but give concrete evidence of a lack of familiarity with the best work in taxonomy.

I am quite aware that, taking their cue from the statement in *Philosophia Botanica*, some like to argue that Linnaeus used the term *varietas*, the subdivisions of species designated in his *Species Plantarum* by greek letters, only for garden "creations" and abnormalities. A little experience with *Species Plantarum* shows, however, the error of such a claim; an extended experience with the works of Linnaeus and his illustrious and wise associates and later editors shows that in actual practice he generally designated as varieties indigenous plants which he considered to be natural (often geographic) variations within the broad limits of his specific concept. The misconception of those who interpret the Linnean use of the term *varietas* by stressing the statement in *Philosophia Botanica*, rather than the actual prac-

tice of Linnaeus, has been well discussed by Ramsbottom in his Presidential Address before the Linnean Society of London, delivered at the 150th Anniversary Celebration in May, 1938. No more wholesome document, in these days of many confused and superficial ideas, can be recommended for the careful consideration of all taxonomists. I venture to quote briefly from this masterly address, *Linnaeus and the Species Concept:*

To return to 'Philosophia Botanica' we find that varieties are defined as in the 'Fundamenta' [1736], where Linnaeus had in mind chiefly what are now known as variations. There are as many varieties as there are different plants, produced from the seed of the same species. (Varietates tot sunt, quot differentes plantae ex ejusdem speciei semine sunt productae.) He adds that a variety is a plant changed by an accidental cause due to the climate, soil, heat, winds, etc. It is consequently reduced to its original form by a change of soil. (Varietas est Planta mutata a causa accidentali: Climate, Solo, Calore, Ventis, &c., reducitur itaque in Solo mutato.) Further, the kinds of varieties are size, abundance, crispation, colour, taste, smell. (Species varietatum sunt Magnitudo, Plenitudo, Crispatio, Color, Sapor, Odor.) Species and genera are regarded as always the work of Nature, but varieties as more usually owing to culture. (Naturae opus semper est Species & Genus; culturae saepius Varietas.) For that reason he would have ignored them in the general discussion of his ideas "published for the sake of my pupils," but that they often have economic, artistic, and medicinal uses.

. . . .

But it is not reasonable to judge Linnaeus's ideas solely by his didactic 'Philosophia Botanica.' His greatest botanical work, his Golden Book, *maximum opus et aeternum*, is 'Species Plantarum,' published two years later. We know from his correspondence that he had been engaged upon the writing of this off and on for about nine years and consequently would not expect to find any departure from the definitions put forth in the 'Philosophia.' However, 'Philosophia Botanica' is precept, 'Species Plantarum' practice. . . . .

. . . .

Perhaps equally striking is the treatment of varieties in 'Species Plantarum' when we bear in mind the definitions repeated two years previously. Far from being merely variations in non-essential characters, they are treated in the same way as species, and as may be seen from some of the quotations already given it is sometimes queried whether what is described as a species is only a variety or vice versa. Constancy is now one of the characteristics: thus var. β. (*fulvus*) of *Hemerocallis Lilio-Asphodelus* is described as "hybrida & constans," and the vars. α. and β. of *Adonis annua* remain distinct. . . . .

How are we to regard this apparent change of view between 1751 and 1753? I think by denying that there had been one. That this is so is shown by the fact that his earlier writings contain similar notes. 'Hortus Cliffortianus,' 1737, is remarkably fully annotated and contains much of interest in showing the development of Linnaeus's ideas. Even here varieties are treated for the most part as permanent forms and

attached to their appropriate species (varietates ad species proprias reduxi). . . . .

'Flora Suecica' was published in 1745. Here again several species are regarded as related to others . . . or perhaps only varieties . . . ; an American *Pyrola* is regarded as a variety of a European species (ergo americana planta hujus varietas est.) Varieties may be inconstant . . . or constant as var. β. of *Alnus*.

. . . .

Though it is obvious, therefore, that there was no change of view, we are still left with the problem of explaining the categorical statements in 'Philosophia Botanica.' Is not the explanation the simple one that this was a text-book, and that too much stress has been placed upon it both by Linnaeus's contemporaries and by those who thought that therein they had an epitome of his botanical philosophy? The series of aphorisms of 1736 were copied practically verbatim into 'Philosophia Botanica' years afterwards. . . . 'Philosophia Botanica,' remarkable as it is, suffered like many more modern text-books in being an enlarged second edition and as a students' book was concerned more with giving them a general account of certain aspects of botany at a stage where it was probably considered better to receive categorical statements than to wander into the realms of real philosophy.[1]

The modern fad of certain botanists, to substitute the heretofore clear term *subspecies,* erroneously used and often misunderstood by them, for the long established *varietas,* as used correctly for more than two centuries, is, as stated, a practice which cheapens the status of true subspecies and makes for inaccuracy and misunderstanding. As shown so clearly by Ramsbottom's analysis of Linnaeus's more scientific writings, it glorifies a text-book precept of 1736 and completely ignores the actual practice in *Hortus Cliffortianus, Flora Suecica* and "his greatest botanical work, his Golden Book, *maximum opus et aeternum* . . . 'Species Plantarum'."

Naturally, in a work dealing with all known plants Linnaeus had to recognize the innumerable garden products, such as the great series in *Brassica* or *Lactuca,* but he did so under strong protest: "Botanists differ from florists in their conception of varieties in this respect: that the former bestow varietal names by way of defining and expressing in words some unique characteristic in the variety: but the latter do reverence to the objects of their worship with names showing their devotion. . . . The objects of Botanists and Florists in regard to varieties are the same, but with this difference, that the Florist begins to play his part where the Botanist leaves off. . . . Hence the species of

[1] Ramsbottom in Journ. Linn. Soc. Lond. 150th Sess., especially pp. 199–205 (1938).

Botanists become the Classes of Florists, the Varieties of Botanists the Orders of Florists."[1] In spite of his inclusion of some horticultural products as varieties, a large proportion of the varieties actually recognized by Linnaeus in *Species Plantarum* are, as Ramsbottom points out, wild plants in nature with strong morphological or geographic differences, the varieties as maintained by the great majority of taxonomists for two centuries. A few from very many illustrations from ed. 1 (1753) are here given, selected as plants familiar to those who are intimate with the North American flora. *Circaea lutetiana* (European) had a var. β. *canadensis* (p. 9), which is the eastern North American *C. quadrisulcata* (Maxim.) Franch. & Sav., var. *canadensis* (L.) Hara in Rhodora, xli. 287 (1939). *Alopecurus geniculatus* (p. 60) had a var. β., which is universally recognized as a distinct species, *A. aequalis* Sobol. *Juncus effusus* (p. 326) had a var. α, "floribus sessilibus," which is the very distinct *J. arcticus* Willd. *Phytolacca americana* (p. 441) from Virginia had a Mexican variety β.; but in the 2d edition Linnaeus himself separated them as two species, *P. decandra* (Virginian) and *P. octandra* (Mexican) and everyone who understands them keeps them apart. *Magnolia virginiana* had 5 varieties: α. *glauca*, β. *foetida*, γ. *grisea*, δ. *tripetala*, ε. *acuminata;* but in ed. 2 (1762) Linnaeus treated them, correctly, as species, *M. acuminata*, *tripetala*, etc. *Eupatorium purpureum* (p. 838) had a var. β., which in ed. 2 became the species *E. maculatum* L. These and scores of other cases (in *Myosotis*, *Erythronium*, *Arenaria*, *Prunella*, *Thlaspi*, *Sisymbrium*, *Arum*, etc.) sufficiently indicate that in actual scientific practice Linnaeus by no means confined the term varietas to garden products and sports, but used it for native plants with such strong morphological and geographic isolation that, in many cases, his own later studies showed them to be true species.

I have never found myself able to join this modern group who base their thesis upon lack of clear understanding. I prefer to be a follower of the practice (not merely the text-book precept) of Linnaeus and of the tremendous army who by their clear understanding and painstaking studies have won lasting honor in the field of taxonomy: such outstanding scholars, who have

[1] Linnaeus, Critica Botanica (1737), transl. of Sir Arthur Hort, 190, 191 (1938).

correctly used the honorable old term *varietas*, to enumerate a few, as N. J. Andersson, Arnott, Ascherson, Babington, Bentham, Bertoloni, Blume, Blytt, Boissier, Boott, Alexander Braun, Robert Brown, Briquet, Buchenau, Bunge, Chamisso, Cogniaux, Cosson, Crépin, Decaisne, A. P. DeCandolle, Alphonse DeCandolle, Desfontaines, Desvaux, Dunal, Eichler, Endlicher, Engelmann, Engler, Fée, Fenzl, Fischer, Franchet, Fries, Gaertner, Garcke, Gaudin, Gay, C. C. Gmelin, C. F. Gmelin, S. C. Gmelin, Godet, Godron, Gray, Greene, Grenier, Grisebach, Hackel, Hemsley, Hillebrand, Hoffmann, J. D. Hooker, W. J. Hooker, Hornemann, Jacquin, Koch, Kunth, Lamarck, Lange, Ledebour, Lehmann, Lindley, Link, Loudon, Martius, Maximowicz, Meisner, Mertens, C. A. Meyer, Michaux, Miller, Moquin-Tandon, Johann Mueller, Nees, Nuttall, Palisot de Beauvois, Persoon, Poiret, Presl, Regel, Reichenbach, Roemer, Ruprecht, Sargent, Schimper, Schlechtendal, Schrader, Schultes (several), Sprengel, Swartz, Torrey, Trattinick, Trinius, Turczaninoff, Underwood, Urban, Ventenat, Warming, Watson, Wettstein and Willdenow.

The easy-going but often quite misleading practice of using trinomials without designation of rank, whether subspecies, variety, form or some other status, is an Americanism which does not reflect sound scholarship nor a desire to be quite clear to others. Those who thus avoid making their categories perfectly definite leave the burden of clarification to the unfortunate users of their work. It is not enough to say, like one author cited on a succeeding page, that "The trinomial in botany is usually referred to as a variety, although the designation subspecies would appear to be more reasonable." By thus "passing the buck," such authors automatically invite the outlawing of their names, for, as shown in the discussion of *Descurainia*, these names are not validly published by the International Rules of Botanical Nomenclature. Far from being definite the trinomial may be hopelessly indefinite. For instance, in his Working List of North American Pteridophyta (1901), the late B. D. Gilbert enumerated the variations of *Athyrium Filix-femina*, mostly on p. 15. He there had as no. 221 "f. rubellum f. nov. Gilbert," but in the Appendix where he described it (p. 35) it changed to *Athyrium filix-femina rubellum* Gilbert, with the statement three times made that it is

a variety, and the objectionable "var." definitely finding place in the discussion: "In var. *rubellum*" etc. Gilbert, evidently, was not sure whether he wanted to call the plant a forma or a variety, though in the second effort he did settle on "var." put into the discussion. The trinomial alone told nothing. How much better to be absolutely definite. The time taken and the clarity of mind necessary correctly to write the abbreviation are slight; the confusion created by its omission or by an explanation of the category hidden somewhere in explanatory text, which no author with generous attitude toward readers of various linguistic stocks should expect them to dig out, is enormous and enduring. As stated, authors who do not clearly designate the category to which their names belong are likely to have their combinations ignored.

Potamogeton Berchtoldi Fieber, var. **tenuissimus** (Mert. & Koch), comb. nov. *P. pusillus* L., var. *tenuissimus* Mert. & Koch in Röhling, Deutschl. Fl. i. 857 (1823).

P. Berchtoldi, var. **lacunatus** (Hagström), comb. nov. *P. lacunatus* Hagström, Crit. Researches Pot. 120, fig. 53 (1916).

P. Berchtoldi, var. **polyphyllus** (Morong), comb. nov. *P. pusillus*, var. *polyphyllus* Morong in Bot. Gaz. v. 51 (1880) and Mem. Torr. Bot. Cl. iii². 46, excluding plant of Fresh Pond (1893).

P. Berchtoldi, var. **colpophilus** (Fernald), comb. nov. *P. pusillus*, var. *colpophilus* Fernald in Mem. Am. Acad. xvii. 90, t. 20, figs. *d* and *e*, and t. 35, fig. 5 (1932).

Ever since it was shown by Dandy & Taylor in Journ. Bot. lxxvi. 90–92 (1938), that the type of *Potamogeton pusillus* L. (1753) is really *P. panormitanus* Biv. (1838) and that the plant passing as *P. pusillus* must be called by the earliest available specific name, *P. Berchtoldi* Fieber (1838), American botanists, wishing to use the varietal names correctly, have awaited their transfer by the two English botanists. A letter to them sent long before the present war, inquiring if they proposed to make the transfers, having brought no reply and many students inquiring what they shall call the different varieties, there seems no discourtesy in getting them properly issued, that they may be available for use.

Fimbristylis **caroliniana** (Lam.), comb. nov. *Scirpus carolinianus* Lam. Illustr. i. 142 (1791). *S. puberulus* Michx. Fl., Bor.-

Am. i. 31 (1803). *Fimbristylis puberula* (Michx.) Vahl, Enum. ii. 289 (1806).

Scirpus carolinianus Lam., was collected in Carolina by Fraser. By *Index Kewensis* it is referred to the synonymy of *Fimbristylis castanea* (Michx.) Vahl, but the type, of which Professor Humbert and M. Metman send me a very clear photograph, shows that the Lamarck species was the usually smaller *F. puberula*, with relatively small ellipsoid-ovoid spikelets. It is very well matched by the photograph published by me of typical *F. puberula* in RHODORA, xxxvii. t. 388, fig. 4; also by the type of *S. puberulus* Michx. (photograph before me) and by material from Petty's Island, Delaware River, New Jersey, October 27, 1866, *C. F. Parker,* by the Virginian specimens of *Fernald & Long,* nos. 3751 and 3746, by *Wiegand & Manning,* no. 553 from Robeson Co., North Carolina and *Wiegand & Manning,* no. 554 from Tallahassee, Florida. The following transfers are necessitated.

F. CAROLINIANA, forma **pycnostachya** (Fernald), comb. nov. *F. puberula,* forma *pycnostachya* Fernald in RHODORA, xxxvii. 396, t. 388, fig. 3 (1935).

F. CAROLINIANA, forma **eucycla** (Fernald), comb. nov. *F. puberula,* forma *eucycla* Fernald, l. c. figs. 1 and 2 (1935).

WHAT IS ARISAEMA TRIPHYLLUM? PLATES 598–600. Linnaeus in 1753 (Sp. Pl. 965) recognized a single American *Arum* with ternate leaves. This species, *Arum triphyllum,* was, however, a composite one, with two designated but unnamed varieties based upon earlier descriptions and figures, while the only specimen seen by Linnaeus himself was supposed to be the same as *Dracunculus sive Serpentaria triphylla Brassiliana, in Prod. descripta* of Bauhin, Pinax, 195 (1671). What the latter may have been is a problem, for in his Prodromus Bauhin gave a full description of *Serpentaria triphylla Brassiliana* with a roundish and 3-lobed (subrotundum, trifidum) leaf; spathe 5 inches long, dark purple, with white stripes, the spadix blackish, oblong and 2-*cleft at tip* (flos . . . longitudine unciarum quinq; atrorubens, striatus, venis albicantibus per medium, . . . pistillo nigricente, oblongo, in summo bifido). Furthermore, it was stated unequivocally to come from Brazil: "Ex Tououpinambault Brassiliae anno 1614. allata."—Bauhin, Prodr. 101 (1671). In view

of the subrotund leaf and the bifid spadix, in addition to the source of the plant in Brazil, the single synonym given by Linnaeus for the Virginian *Arum acaule, foliis ternatis* of Gronovius, must have been erroneously associated with the Gronovian species. Linnaeus cited under the Brazilian reference the treatment of Dodart, Memoires, 81 (1676), and others have cited Dodart's remarkably clear plate. The latter, said to be *Dracunculus sive Serpentaria triphylla Brasiliana*, was drawn from a specimen secured from Canada! It is an excellent representation of the commonest form of the wide-ranging species which has been erroneously passing as *A. triphyllum* (var. *zebrinum* Sims); and it represents nothing Brazilian. Blume treated the reputed plant of Brazil as a distinct species, *Arisaema brasilianum* Blume, Rumphia, i. 96 (1835), but he added nothing definitely clarifying its identity. In Flora Brasiliensis, iii². 47 (1878) Engler explicitly states that "Tribus V. AREAE Engl. cum subtribubus 1) ARISARINAE Schott (gen. *Arisarum* . . . , *Arisaema* Mart., *Pinella* Ten.) . . . omnino extra-brasiliensis est"; and in 1879 (Araceae in DC. Mon. i. 534) Engler definitely reduced *Arisaema brasilianum* to the aggregate eastern North American species. In view of the confusion, however, as to *A. brasilianum*, based upon a reputed Brasilian plant, it is wisest not to consider *Dracunculus sive Serpentaria triphylla Brassiliana*, at least of Bauhin, as a primary basis of *Arum triphyllum* L. In order that the Linnean treatment may be clearly understood it is here reproduced.

4. A R U M acaule, foliis ternatis. *Gron. virg. 113.* *triphyllum.*
Dracunculus s. Serpentaria triphylla brasiliana. *Bauh. pin. 195. prodr. 101. Dod. mem. 81.*
β. Arum minus triphyllum s. Arisarum, pene viridi, virginianum. *Moris. hist. 3. p. 547. s. 13. t. 5. f. 43.*
γ. Arum s. Arisarum triphyllum minus, pene atrorubente, virginianum. *Pluk. alm. 52. t. 77. f. 5.*
Habitat in Virginia, Brasilia. ♃.
Plantae brasilianae *foliola lateralia extrorsum lobata,* virginiae *autem tantum, gibba, eandem tamen suadet* Floris *structura.*

It will be seen that the single unequivocal basis of true *Arum triphyllum* L. was the Gronovian *Arum acaule, foliis ternatis.* It is important, therefore, that a specimen of this plant, which Linnaeus had in his own herbarium prior to 1753 and which he

Photo. H. G. Fernald.

ARISAEMA TRIPHYLLUM: FIG. 1, TYPE (leaf and smaller spathe), × 1, of ARUM TRIPHYLLUM L.; FIG. 2, spathe, laid open, × 1, from type-region, Virginia; FIG. 5, seeds, × 5, from Virginia.

A. TRIPHYLLUM, forma PUSILLUM: FIG. 3, spathe, laid open, × 1, from New Jersey.

A. TRIPHYLLUM, var. ACUMINATUM: FIG. 4, spathe, laid open, × 1, from Florida.

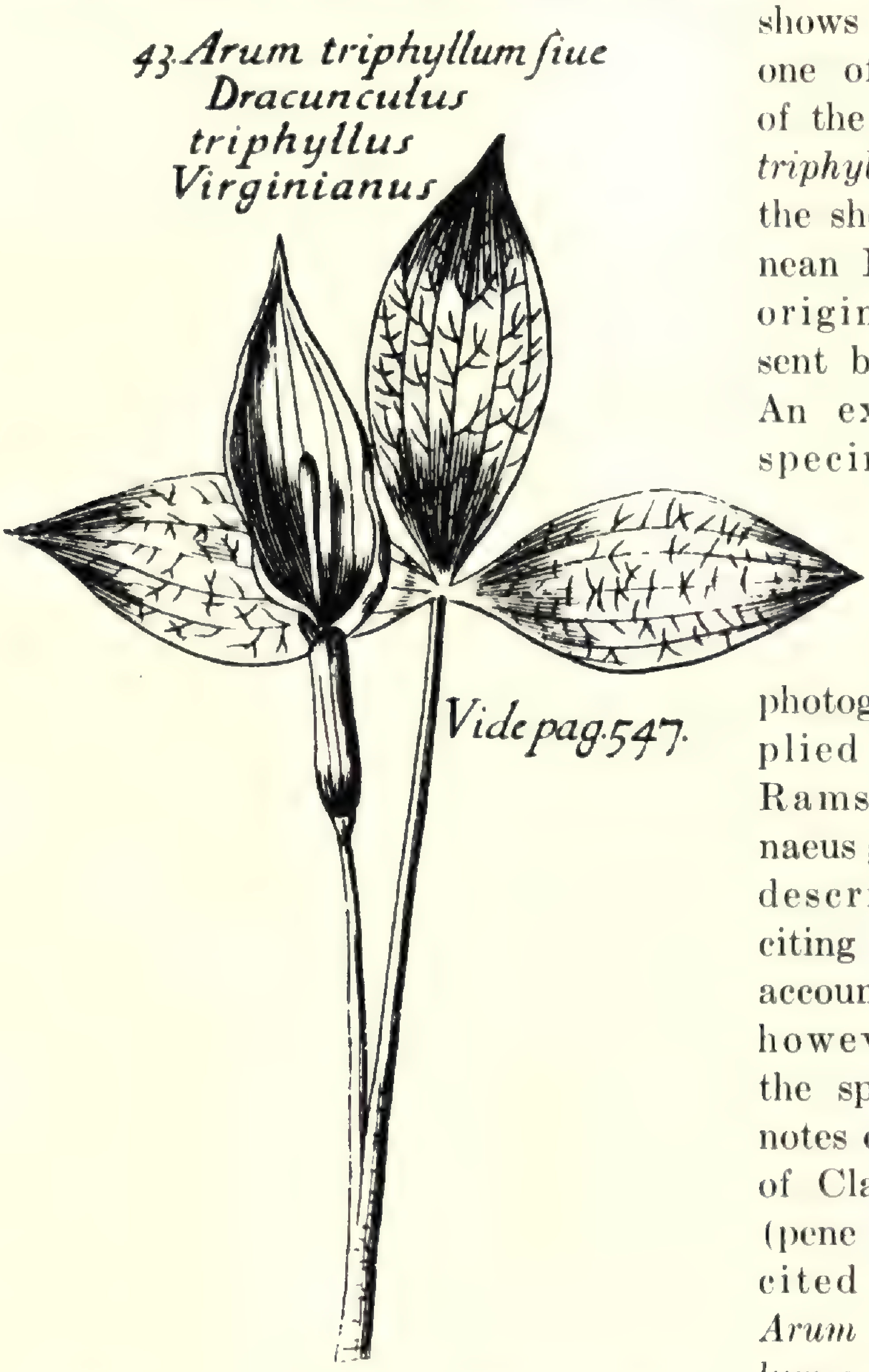
Photo. H. G. Fernald.

Arisaema atrorubens: fig. 1, spathe, laid open, × 1, from Maine; fig. 4, seeds, × 5, from Pennsylvania.

A. atrorubens, forma zebrinum: fig. 2, spathe, laid open, × 1, from Virginia.

A. atrorubens, forma viride: fig. 3, spathe, laid open, × 1, from South Carolina.

marked "4. *triphyllum*," consequently the TYPE of the species, is the green-spathed form of *Arisaema pusillum* (Peck) Nash in Britton, Man. 229 (1901), based on *A. triphyllum*, var. *pusillum* Peck, N. Y. State Mus. Rep. li. 297 (1898). PLATE 598, FIG. 1, shows the leaf and one of the spathes of the TYPE of *Arum triphyllum*, × 1, from the sheet in the Linnean Herbarium, the original photograph sent by Mr. Savage. An exactly similar specimen is in the Gronovian Herbarium at the British Museum, a photograph of it supplied through Dr. Ramsbottom. Linnaeus gave no original description, merely citing the Gronovian account. Gronovious, however, described the spadix from the notes of Banister and of Clayton as green (pene viridi) and he cited as identical *Arum minus triphyllum s. Arisarum pene viridi Virginianum* of Morison's Plantarum Historiae Oxonensis, iii. sect. xiii. 547, no. 44, t. 5. fig. 43 (1715). This is the reference given by Linnaeus as the sole basis of his *Arum triphyllum*, β., and Morison's plate 5, fig. 43 shows a plant (our text-figure 1) readily referable to *Arisaema pusil-*



TEXT-FIG. 1. Morrison's figure of *Arum triphyllum*.

lum. It should be noted, however, that in the text (p. 547) Morison cites no figure under his no. 44, *Arum minus triphyllum sive Arisarum pene viridi Virginianum,* but the plate was cited by him under his no. 43, *Arum triphyllum Virginianum flore pallido, pistillo atrorubente,* although on the plate he called it *Arum triphyllum sive Dracunculus triphyllus Virginianus,* thus introducing a confusion which I do not attempt to clear. The main point is, that, regardless of early literary confusions, the actual TYPE of *Arum triphyllum* must be taken as the plant which Linnaeus had before him (our PLATE 598, FIG. 1).

Until 1901, when both *Arisaema pusillum* (Peck) Nash (our PLATE 598, FIG. 3) and *A. Stewardsonii* Britton (our PLATE 600, FIG. 4) were put forward as species, botanists generally supposed that we had in temperate eastern North America a single polymorphous species, to which several specific names had been needlessly given. So far as I can determine *A. Stewardsonii* has a clear title; the identity of *A. pusillum* as true *A. triphyllum* has been discussed. There remains the hope that one of the earlier names may clearly belong to the species (PLATE 599) which has generally passed as *A. triphyllum,* the plant with leaves glaucous and dull beneath (when fresh), the lateral leaflets strongly rounded on the lower side, the horizontally rounded summit of the spathe-tube with a flange 2–8 mm. broad, the broadly oblong-ovate abruptly acuminate hood 3–6 cm. broad, the fruiting head 3–6 cm. long, the depressed-globose or reniform seeds deeply invaginated at base. This is the common and often rather coarse species of rich woods and thickets from New Brunswick and adjacent Quebec to southeastern Manitoba, south to South Carolina, Tennessee, Missouri and eastern Texas. Its hood varies from purple to green, often with pale longitudinal stripes.

Contrasting with the wide-ranging and inland plant which erroneously passes as *Arisaema triphyllum,* true *A. triphyllum* (*A. pusillum*) is usually smaller (PLATE 598); its leaves are green and lustrous beneath, the lateral leaflets acute at base; the flange at the summit of the spathe-tube is narrow (0.5–2 mm. wide); the narrowly oblong to lance-ovate attenuate hood is only 2–3 cm. broad and solidly green or solidly purple on the inner face, without pale stripes above the base; the fruiting heads are only 1.5–2 cm. long; the obovoid seeds stipitate and not clearly in-

vaginated at base. This is a plant of the southern Coastal Plain and Piedmont, occurring in wet woods and about spring-heads from Florida to Kentucky, northward to southeastern New York, Connecticut and southeastern Massachusetts.

Arisaema Stewardsonii (PLATE 600, FIG. 4) in the fresh material is strikingly different. Its tuber frequently sets off stolons or stalked plantlets; its foliage is similar to that of the preceding species, but its spathe has the inrolled tube sharply and deeply corrugated with white ridges (corrugations disappearing in drying), green or purple, the summit tapering gradually into the narrowly ovate (2–6 cm. broad) attenuate green to purple hood; fruiting head 2.5–3.5 cm. long; seeds as in *A. triphyllum* (*pusillum*). *A. Stewardsonii* is a plant of wet or swampy woods and thickets from Nova Scotia and Prince Edward Island to Minnesota, south to northern New Jersey and Pennsylvania.

Returning to the species with fresh foliage glaucous beneath, the lateral leaflets rounded at base, the spathe with smooth tube and horizontally rounded broad-flanged summit, several early names seem to belong to it. It was, probably, the *Arum s. Arisarum triphyllum minus, pene atrorubente, virginianum* of Plukenet, Almagestum, 52, t. 77, fig. 5; therefore, as the only cited plant, *Arum triphyllum*, γ. of L. Sp. Pl. 965 (1753). Plukenet's description is very brief and quite inconclusive and his figure is very far from satisfactory. It might have been conventionalized from a specimen of the glaucous-leaved plant. The first reasonably clear name for this species is *Arum atrorubens* Ait. Hort. Kew. iii. 315 (1789). Aiton recognized two North American species: *A. triphyllum*, described quite correctly (in the sense of the Linnean type) "foliis ternatis, lamina lanceolata acuminata"; and the new *A. atrorubens* "lamina ovata," cultivated from Virginia by Philip Miller in 1758. Aiton, to be sure, took his specific name from the not wholly definite *Arum s. Arisarum triphyllum minus, pene atrorubente virginianum* of Plukenet (see above); but since Aiton had fresh material with *ovate* (as contrasted with lance-acuminate) leaflets, his name may be accepted. Unfortunately, Mr. Weatherby, who sought, when in England, for Aiton's type, could find nothing to stand for his species. I am, however, adopting for the plant which has recently passed as *Arisaema triphyllum* the name *A. atrorubens*

(Ait.) Blume, Rumphia, i. 97 (1835). Its identity is reasonably certain.

Both *Arisaema triphyllum* and *A. atrorubens* vary greatly in the color of the spathes. These color-forms have mostly been named as varieties. In so far as I can identify the old names I have taken them up. The bibliography of the two long confused species follows.

Arisaema triphyllum (L.) Schott in Schott & Endlicher, Meletemata, i. 17 (1832). *Arum triphyllum* L. Sp. Pl. ii. 965 (1753) as to type. *Arum triphyllum, β. viride* Sims, Bot. Mag. sub. t. 950 (1806), based on Morison's plate. *Arisaema pusillum* (Peck) Nash, forma *pallidum* E. H. Eames in Rhodora, xxxiii. 168 (1931).—Hood of spathe and tip of spadix green. Plate 598, figs. 1 and 2.

Forma **pusillum** (Peck), comb. nov. *A. triphyllum,* var. *pusillum* Peck in N. Y. State Mus. Rep. li. 297 (1898). *A. pusillum* (Peck) Nash in Britton, Man. 229 (1901).—Hood full purple-brown on inner face. Plate 598, fig. 3.

A. atrorubens (Ait.) Blume, Rumphia, i. 97 (1835). *Arum atrorubens* Ait. Hort. Kew. iii. 315 (1789). *A. triphyllum, β. atropurpureum* Michx. Fl. Bor.-Am. ii. 188 (1803), probably (type not seen). *A. triphyllum* sensu recent Am. auth., not (L.) Schott.—Hood purple, without pale stripes. Plate 599, fig. 1.

Forma **zebrinum** (Sims), comb. nov. *Arum triphyllum, α. zebrina* Sims, Bot. Mag. t. 950 (1806). *A. hastata* Blume, Rumphia, i. 96 (1835), plant with hastate-lobed leaflets.—Hood purple or bronze within, purple to greenish without, with long pale stripes on inner face. Plate 599, fig. 2.

Forma **viride** (Engler), comb. nov. *Arum triphyllum,* var. *β. virens* Michx. Fl. Bor.-Am. ii. 188 (1803), photograph of type in Gray Herb. *Arisaema atrorubens, β. viride* Engler in DC. Monogr. i. 536 (1879). *Aris. triphyllum,* var. *viride* (Engler) Engler, Pflanzenr. iv[23f]. 200 (1920). *Aris, triph.,* forma *viride* (Engler) Farwell (as *vivide*) in Am. Midl. Nat. xi. 50 (1928), xii. 53 (1930).—Spathe green, without or with only faint stripes. Plate 599, fig. 3.

In order to clarify the identities I am showing characteristic spathes of the different species and forms laid out to show the summit of the sheath and the flange at the junction of sheath and hood, in each case, × 1.

In plate 598, fig. 2 is the spathe of *A. triphyllum* from Great Neck, Princess Anne County, Virginia, *Fernald & Griscom,* no. 4351, plant identified by Mr. *C. A. Weatherby* with the original Clayton material; fig. 3, *A. triphyllum,* forma *pusillum* from Chestnut Neck, Mullica River, Port Republic, Atlantic County, New Jersey, *B. Long,* no. 12,064. Plate 599,

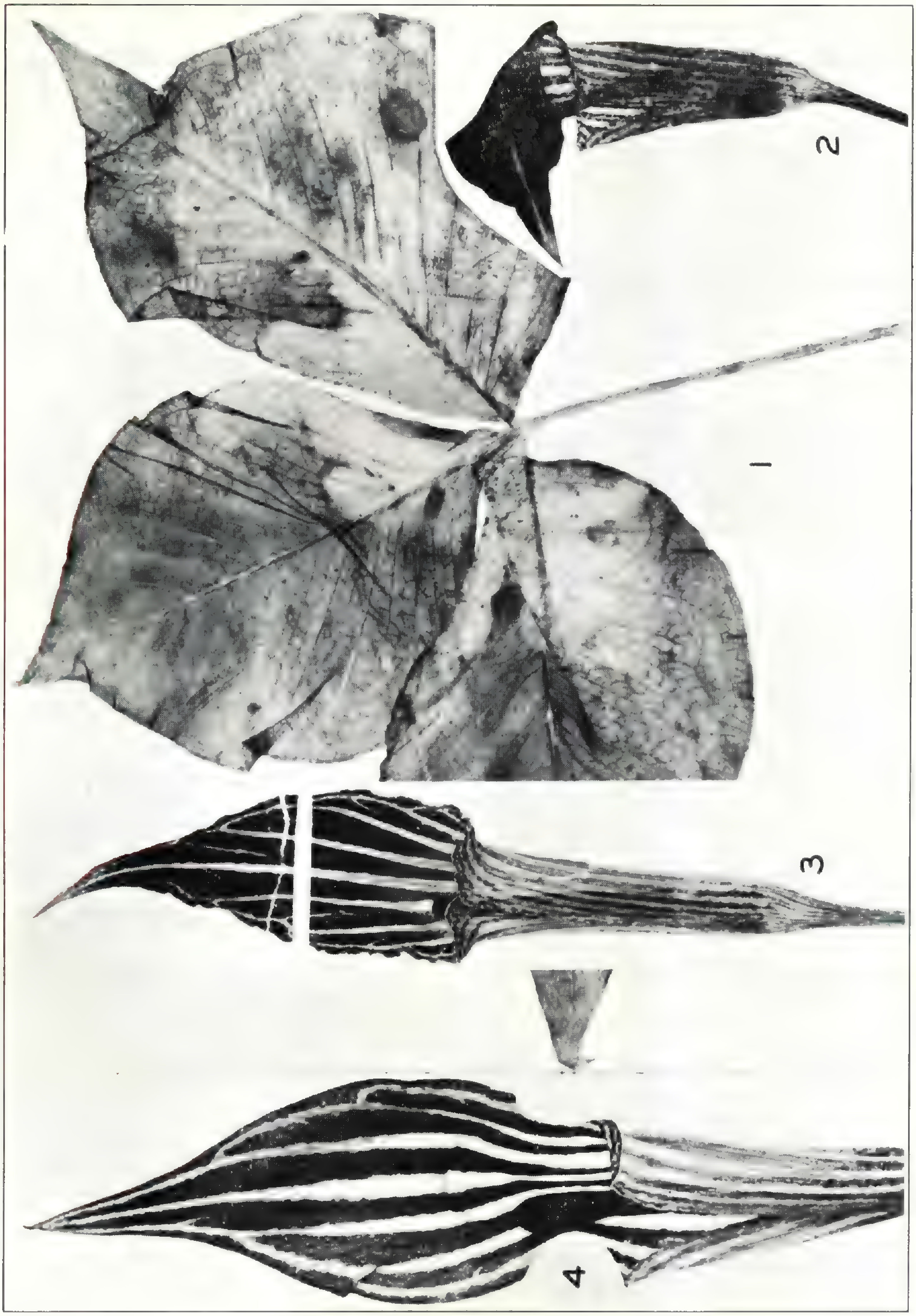


Photo. H. G. Fernald.

Arisaema triphyllum, var. montanum: figs. 1 and 2, leaf and spathe, × 1, from the type; fig. 3, spathe, laid open, × 1, from North Carolina.
A. Stewardsonii: fig. 4, spathe, laid open, × 1, from Pennsylvania.

Fig. 1. Type of Melanthium densum Desv., × ½.
Fig. 2. Type of Helonias angustifolius Michx., × ½.

FIG. 1, is *A. atrorubens* from Hartford, Maine, *Parlin,* no. 2089; FIG. 2, *A. atrorubens,* forma *zebrinum* from southeast of Hopewell, Prince George County, Virginia, *Fernald & Long,* no. 9702; FIG. 3, *A. atrorubens,* forma *viride,* from Myrtle Beach, Horry County, South Carolina, *Weatherby & Griscom,* no. 16,469. PLATE 600, FIG. 4, is *A. Stewardsonii* Britton from Little Mud Pond, 4 miles northeast of Porter's Lake, Pike County, Pennsylvania, *Fogg,* no. 10,732. The seeds of *A. triphyllum,* × 5, are shown in PLATE 598, FIG 5, these from Little Neck, Princess Anne County, Virginia, *Fernald & Long,* no. 3822; characteristic seeds, × 5, of *A. atrorubens* from south of Milltown, Chester County, Pennsylvania, *Adams & Tash,* no. 558, are shown in PLATE 599, FIG. 4.

Two southern plants, *Arisaema quinatum* (Nutt.) Schott, with mostly quinate leaves and *A. acuminatum* Small, should be noted. The former is apparently only a frequent phase of *A. atrorubens* which often has the lateral leaflets lobed; while *A. acuminatum* (PLATE 598, FIG. 4) shows nothing but great size to separate it from typical *A. triphyllum.* The stalked obovoid seeds are too similar. I am leaving it as *A. triphyllum,* var. *acuminatum* (Small) Engler but gigantic plants of more northern *A. triphyllum* (rarely collected because of their great size) suggest that var. *acuminatum* is likely to prove of no taxonomic importance. The characteristic spathe, FIG. 4, is from Duval County, Florida, *A. H. Curtiss,* no. 2681.

Typically *Arisaema triphyllum* has the leaflets quite green on both sides, the relatively narrow leaflets attenuate or acuminate at both ends, the hood solidly colored (greenish or dark purple) and without clear striping. On the Cumberland Plateau of Tennessee and in western North Carolina there is an anomalous plant, with relatively broad and strongly rounded leaflets glaucous beneath, the spathe as in *A. triphyllum,* forma *pusillum,* except that it is clearly striped. In its extreme it is very definite, but one collection from Biltmore, North Carolina, with broadly rounded leaflets, has the solidly purple hood of forma *pusillum.* I am, therefore, treating the extreme plant as a variety because of its three characters. Further material may necessitate another disposition of it. I call it

ARISAEMA TRIPHYLLUM (L.) Schott, var. **montanum,** var. nov. (TAB. 600, FIG. 1–3), foliolis late obovatis vel ovatis apice subulato-aristatis subtus glaucis; spathe laminis intus purpurascentibus valde pallide striato-vittatis.—TENNESSEE: rocky slope at Caney Creek Falls, alt. 1200 feet, May 13, 1934, *E. B. Harger,* no. 7745 (TYPE in Herb. Gray.). NORTH CAROLINA: deep and rich woods, Biltmore, May 15, 1897, *Biltmore Herb.,* no. 1288[b].

In PLATE 600, FIG. 1 shows a characteristic leaf and FIG. 2, a spathe, × 1, of the TYPE; FIG. 3 a spathe opened out, × 1, of *Biltmore* no. 1288[b].

ZIGADENUS **densus** (Desr.), comb. nov. *Melanthium densum* Desr. in Lam. Encycl. iv. 26 (1796). *Helonias augustifolius* Michx. Fl. Bor.-Am. i. 212 (1803). *Amianthium angustifolium* (Michx.) Gray in Ann. Lyc. N. Y. iv. 121 (1848). *Z. angustifolius* (Michx.) Wats. in Proc. Am. Acad. xiv. 280 (1879). *Tracyanthus angustifolius* (Michx.) Small, Fl. Se. U. S. 251, 1328 (1903).

Desrousseaux thought that his new *Melanthium densum* might perhaps be the same as *Veratrum luteum* L. and gave the latter as a doubtful synonym. Consequently, later authors, including *Index Kewensis,* have assumed without examining Desrousseaux's material or detailed description that his *M. densum* is *Chamaelirium.* Desrousseaux's material, in Lamarck's herbarium, was collected in Carolina by Fraser. Its inflorescence, × ½, is shown in PLATE 601, FIG. 1. FIG. 2 is Michaux's type, also × ½, of *Helonias angustifolius.* That they are the same there can be no question.

STELLARIA CALYCANTHA (Ledeb.) Bongard, var. **laurentiana,** var. nov. (TAB. 602, FIG. 1 et 4), caulibus crassis 1–2 mm. diametro 3–5 dm. altis; foliis lanceolatis, primariis 3–7 cm. longis 5–11 mm. latis; pedunculis valde elongatis, imis 2–4 cm. longis, maturis adscendentibus; calycibus 4.5–5 mm. longis; capsulis maturis 5–6 mm. longis; stylis 1.3–1.6 mm. longis; seminibus 0.7–0.9 mm. longis.—QUEBEC: Anticosti Island, *Pursh;* Baie St. Claire, Anticosti, August 19, 1917, *Victorin,* no. 4219 (as *Moehringia macrophylla*); calcareous sea-cliffs and rock-slides by Gulf of St. Lawrence, Christie, Gaspé County, July 25, 1922, *Fernald & Pease,* no. 25,058 (TYPE in Herb. Gray); damp cold ledges, Baie Orignal, Bic, Rimouski County, June 27, 1905, *F. F. Forbes.*

Differing from the other eastern American variations of *Stellaria calycantha* (discussed below) in the great size of all its parts; our other eastern plants, true *S. calycantha* (*S. borealis* Bigel.) and its vars. *isophylla* and *floribunda,* having usually smaller leaves, mature calyx 2–3.5 (rarely –4) mm. long, mature capsules 3–5 mm. long, shorter styles and smaller seeds. Var. *laurentiana* was mistaken by me in RHODORA, xvi. 151 (1914) for the Pacific American *S. borealis* (or *calycantha*), var. *Bongardiana* Fernald, which has similarly long calyx, capsule, styles

and seeds, but in maturity has the fruiting peduncles abruptly reflexed from the base.

The probable necessity to take up for the familiar *Stellaria borealis* the less known name *S. calycantha* makes it unfortunately necessary to transfer several varietal names and also to evaluate the characters recently emphasized in the group. In order that the situation may be clear it is important to illustrate the various points by photographs taken by Mr. Hodge. The transfers follow.

S. CALYCANTHA, var **Simcoei** (Howell), comb. nov. *Alsine Simcoei* Howell, Fl. Nw. Am. i. 83 (1897). *S. borealis,* var. *Simcoei* (Howell) Fernald in RHODORA, xvi. 150 (1914).

S. CALYCANTHA, var. **isophylla** (Fernald), comb. nov. *S. borealis,* var. *isophylla* Fernald, l. c. (1914). PLATE 602, FIG. 2; PL. 603, FIG. 4.

S. CALYCANTHA, var. **floribunda** (Fernald), comb. nov. *S. borealis,* var. *floribunda* Fernald, l. c. 151 (1914). PLATE 603, FIG. 2.

S. CALYCANTHA, var. **Bongardiana** (Fernald), comb. nov. *S. borealis,* var. *Bongardiana* Fernald, l. c. (1914). *S. sitchana* Steud., var. *Bongardiana* (as *Bongardia*) (Fernald) Hultén, Fl. Aleut. Isl. 165 (1937). PLATE 602, FIG. 3.

S. CALYCANTHA, var. **sitchana** (Steud.), comb. nov. *S. sitchana* Steud. Nom. ed. 2, ii. 637 (1841). *S. borealis,* var. *sitchana* (Steud.) Fernald, l. c. (1914). PLATE 602, FIG. 5; PL. 603, FIGS. 1 and 3.

Fenzl,[1] to whose judgment in the *Caryophyllaceae* everyone defers, had reduced *Stellaria borealis* Bigel. to *S. calycantha* (Ledeb.) Bongard, based upon *Arenaria calycantha* Ledeb. (1812) and, therefore, with a specific name older than *S. borealis* Bigel. (1824); and there was special significance in the fact that Ledebour's species was thus disposed of by Fenzl in Ledebour's Flora Rossica. When, however, in 1914 I doubted this identity and stood by the clearly described *S. borealis* Bigel., I based my skepticism upon the original diagnosis of *Arenaria calycantha* Ledeb. in Mém. de l'Acad. Sci. St. Pétersb. v. 534 (1812). Ledebour, along with Boissier, Schlechtendal, Bigelow and Torrey, stands out as one of the most accurate phytographers of his time. I, therefore, disliked to take up for *S. borealis,* with erect flowers on naked peduncles, the name given by Ledebour, for his

[1] Fenzl in Ledebour, Fl. Ross. i. 382 (1841).

Arenaria calycantha from Siberia was described with "pedunculis . . . diphyllis" or again "Pedunculi supra medium diphylli . . . Flores nutantes, interdum bractea ovata." Dr. Eric Hultén, however, in his Flora of Kamtchatka, ii. 64 (1928) unequivocally states that "the type-specimen in Hb. Hort. Petrop. of *Arenaria calycantha* Ledeb. which I have seen is identical with our plant [*S. borealis*], and it must therefore bear the name *Stellaria calycantha*." There is, consequently, no course, assuming that the plant Hultén examined was the actual type and that he correctly understood the characters of *S. borealis,* but to take up the very imperfectly described *S. calycantha.*

To this extent I am following him (and before him, Fenzl and Ledebour), with the reservation that a good photograph of the type, when it can be secured, may change the interpretation; but I cannot follow him when he says: "Fernald . . . includes as varieties under *S. borealis* Bigel. several forms which in my opinion represent distinct species" (p. 61). In his Flora of the Aleutian Islands, 164, 165 (1937), Hultén treats *S. sitchana* (*S. calycantha,* var. *sitchana*), with *S. sitchana,* var. *Bongardiana* (Fernald) Hultén, but misspelled *Bongardia* (*S. calycantha,* var. *Bongardiana*), as a species quite distinct from *S. calycantha* (*S. borealis*), quoting the characters I had used for them as varieties (merely the overlapping differences in length of calyx and capsule), to which he added "other characteristics"—"the styles are about twice as long (often broken on herbarium specimens), the stem is distinctly quadrangular and scabrous, especially on the edges, and, in many cases at least, short petals are developed. *S. calycantha* has a smooth, not quadrangular stem and no petals. As, furthermore, Fernald's varieties have a geographical area of their own and in general appearance differ considerably from typical *S. calycantha,* I think they together form a separate species."

As to the general appearance which Hultén finds to "differ considerably," plate 602, fig. 2, shows the upper part of one of the type specimens, × 1, of *S. calycantha,* var. *isophylla* (from New Hampshire), with sepals 2–3.5 mm. long; fig. 3 is from the upper half of a specimen, × 1, of var. *Bongardiana* from Atka Island (Dall), cited by Hultén and labelel by him as *S. sitchana,* var. *Bongardiana.* The difference in appearance does not seem

Photo. W. H. Hodge.

Stellaria calycantha (*S. borealis*): fig. 6, fruiting calyx, × 5, from White Mountains, New Hampshire (type-region of *S. borealis*).

Var. laurentiana: fig. 1, portion of type, × 1; fig. 4, fruiting calyx, × 5, from Anticosti.

Var. isophylla: fig. 2, portion of type, × 1.

Var. Bongardiana: fig. 3, portion of plant, × 1, from Atka Island, Alaska.

Var. sitchana: fig. 5, fruiting calyx, × 5, from Wrangel, Alaska.

Photo. W. H. Hodge.

STELLARIA CALYCANTHA, var. SITCHANA: FIG. 1, portions of plant, × 1, from Oregon; FIG. 3, portion of stem, × 10, from Wrangel, Alaska.
Var. FLORIBUNDA: FIG. 2, portion of plant, × 1, from Ontario.
Var. ISOPHYLLA: FIG. 4, portion of stem, × 10, from New York.

to me specific. PLATE 603, FIG. 1, is a specimen, × 1, of the reputed species, *S. sitchana*, from Oregon (*Sheldon*, no. 8241); FIG. 2 a specimen, × 1, of *S. calycantha*, var. *floribunda* from near Lake Superior (John Macoun). I fail to get the specific dissimilarity in appearance, except that the mature fruiting peduncles of the former are more generally (but not always) reflexed than in the latter. PLATE 602, FIG. 4, shows a mature calyx and capsule, × 5, from an Anticasti (*Victorin*) specimen of the eastern *S. calycantha*, var. *laurentiana;* PLATE 602, FIG. 5, is a mature calyx and capsule, also × 5, from Alaskan var. *sitchana* (Wrangel, July 22, 1891, *Cooley*). The differences are not striking. Nor do the calyx and capsule, × 5 (FIG. 6), of *S. calycantha* from the White Mountains (type area of *S. borealis*) show any appreciable difference except in size, FIG. 6 from Ice Gulch, Randolph, New Hampshire, September 2, 1890 (Churchill).

If, as Hultén asserts, the type of *Stellaria calycantha* "is identical with our plant [*S. borealis*]" and if, as he also states, the wide-ranging *S. calycantha*, with relatively short calyx, capsule and styles, differs from the more localized and larger-flowered *S. sitchana* by having a "smooth, not quadrangular stem and no petals," it is most remarkable that that master of accurate observation and description, Jacob Bigelow, should, in his original description of *S. borealis* from the White Mts. of New Hampshire, have defined his new species as having "Stem . . . angular . . . Petals white, deeply cloven" (Bigelow, Fl. Bost. ed. 2; 182); that, still earlier, André Michaux, getting one of the narrow-leaved varieties (*S. calycantha*, var. *floribunda*) of the small-flowered series "in borealibus Americae septentrionalis" (which, as shown in his herbarium at Paris, meant Lake Mistassini and the Saguenay River), should have described it, as his *Spergulastrum lanceolatum*, "floribus petaliferis . . . Petala brevissima, ovalia" (Michx. Fl. Bor.-Am. i. 275); that Hooker, with material from "Throughout Canada" which, as shown by his detailed and critical discussion (his p. 99), he clearly understood, should have described *S. borealis* unequivocally "petalis bipartitis calyce aucto trinervia vix longioribus" (Hook. Fl. Bor.-Am. i. 94); that Torrey & Gray, both familiar with the common eastern plant, should have characterized *S. borealis* with "petals (sometimes none) 2-parted, nearly the length of the . . . sepals" (T. & G. Fl.

N. Am. i. 185). Michaux, Bigelow, Hooker, Torrey and Gray all knew their plants; and their uniform characterization of *S. borealis* (or *calycantha*) as having petals (sometimes not) is supported by the experience of others who have long known (some of us for more than half-a-century) the wide-ranging and highly variable plant with relatively short sepals, capsules, styles and seeds.

As to Hultén's other point, that the larger-flowered western series which he calls a distinct species, *Stellaria sitchana*, has "the stem . . . scabrous," while the small-flowered *S. calycantha* (*S. borealis*) "has a smooth . . . stem," I can only regret that he did not study a very full series of the North American plants. Had he examined with a medium-power binocular a good series of such plants as *S. calycantha* and vars. *isophylla* and *floribunda*, he would have found the stems of some plants glabrous, of others fully as scabrous (and that only remotely) as in much of the material of *S. sitchana*. Plate 603, fig. 3, shows a portion of stem, × 10, of *S. calycantha*, var. *sitchana* from Wrangel, Alaska, July 22, 1891 (*Cooley*); while fig. 4 is a similar piece, also × 10, of stem of var. *isophylla* from Madison County, New York (*House*, no. 17,651). The reputed "specific" difference, that the stem of the former is scabrous, that of the latter smooth, obviously is an unstable one.

The one usually decisive character which distinguishes vars. *sitchana* and *Bongardiana*, with mature calyx 4–5.5 mm. long and mature capsule 5–8 mm. long, from the series of *Stellaria calycantha*, with mature calyx 2–3.5 (–4) mm. long and capsules 3–5 mm. long, is the strong reflexing of the fruiting peduncles in the former series (this one often apparently constant, though only tardily developed, distinctive character not mentioned by Hultén), for the local var. *laurentiana*, of shores of the Gulf of St. Lawrence in Quebec, with ascending fruiting peduncles, is otherwise inseparable from the western var. *Bongardiana*. This character, however, loses its virtue when the fruiting peduncles of the small-flowered eastern plant become reflexed (see pl. 603, fig. 2).

Typical *Stellaria calycantha* has glabrous or only remotely scabrous stems. On the mountains from Washington to Montana and northern California var. *Simcoei* closely resembles it in its

short and broad leaves, but the upper branches are definitely pilose. It is, therefore, noteworthy that Dr. G. N. Jones, unquestioningly accepting (Fl. Pl. and Ferns of Mt. Rainer, 76) Hultén's verdict, that *S. sitchana* is a distinct species, reduces without comment the local and uniquely pilose-stemmed *S. Simcoei* to the synonymy of the wide-ranging glabrous *S. calycantha*. Right here is a key-note to the whole situation. The series is one of the hundreds of plastic boreal species, growing extensively across or near the areas in which Pleistocene activity was extensive. Such species appear in different areas in somewhat different phases. To me these are geographic varieties, so confluent in their different characters that the sorting of specimens into piles with more than a single character semi-constant is seemingly impossible. Until some stable character besides the tardy reflexing of the peduncles is demonstrated for the western *Stellaria sitchana* I must continue to retain it within the plastic and wide-ranging *S. calycantha*.

Lychnis alpina L., var. **americana,** var. nov., omnibus partibus majoribus quam in planta Europaea; foliis radicalibus subcoriaceis 1.5–6.5 cm. longis 2–8 mm. latis; foliis caulinis 3–7-jugis, imis 1.5–5.5 cm. longis 2.5–10 mm. latis; calycibus 5–7 mm. longis; petalis roseis 8.5–14.5 mm. longis 3–6 mm. latis.—Greenland, Labrador, Newfoundland and eastern Quebec, southward confined to magnesian soils. Type: serpentine and magnesian limestone barrens, northeastern bases and slopes of Blomidon ("Blow-me-down") Mountains, Bay of Islands, Newfoundland, July 24, 1910, *Fernald & Wiegand,* no. 3395 (Herb. Gray).

Forma **albiflora** (Lange), comb. nov. *Viscaria alpina* (L.) Fenzl, forma β. *albiflora* Lange, Consp. Fl. Groenl. 19 (1880).

The albino form of var. *americana* is rare in comparison with the ordinary rosy-flowered plant.

The North American plants are usually coarser throughout than *Lychnis alpina,* var. *typica*[1] of Europe. Occasional collections from Iceland and Italy are as stout as ours and some from Iceland and Norway have flowers approaching ours in size. Furthermore, dwarfed American plants (especially from Greenland) may be as small as in some European specimens; but the average and ranges of size of the different organs shows a marked

[1] Lychnis alpina L., var. **typica.** *L. alpina* Sp. Pl. i. 436 (1753).

geographic segregation. 36 series of the European plant (typical *L. alpina*), including 130 plants, and 64 series, including 175 plants, of var. *americana* give the following results.

Var. typica	Var. americana
Radical leaves 1–3.5 cm. long, 2–5 mm. broad; cauline leaves 2–4 pairs, the larger leaves 1–3 cm. long and 2–5 mm. broad; calyx during anthesis 3–5 mm. long; petals (including claw) 6–8 (rarely –9) mm. long, 3–3.5 (–4) mm. broad.	Radical leaves thicker and firmer, 1.5–6.5 cm. long, 2–8 mm. broad; cauline leaves 3–7 pairs, the larger leaves 1.5–5.5 cm. long and 2.5–10 mm. broad; calyx during anthesis 5–7 mm. long; petals (including claw) 8.5–14.5 mm. long, 3–6 mm. broad.

The stature is variable but the following comparison is illuminating. Of var. *typica* 38% of the plants are less than 1 dm. high, of var. *americana* only 13%. Of var. *typica* 39% are from 1–1.5 dm. high, of var. *americana* 29%. Of var. *typica* only 14% are from 1.5–2 dm. high, of var. *americana* 29%. Of var. *typica* only 7% of the plants are 2–3 dm. high, of var. *americana* 27%, while no plants seen by me of var. *typica* are more than 3 dm. high, but 2% of var. *americana* are 3–4 dm. high.

Similarly, all but a few of the plants of var. *typica* have the stem (dried) at most 2 mm. in diameter at the first cauline node; but most plants of var. *americana* have the stems 2–4 mm. in diameter.

Silene caroliniana Walt., var. **pensylvanica** (Michx.), comb. nov. *S. pensylvanica* Michx. Fl. Bor.-Am. i. 272 (1803). *S. caroliniana*, subsp. *pensylvanica* (Michx.) Clausen in Rhodora, xli. 580 (1939).

S. caroliniana Walt., var. **Wherryi** (Small) comb. nov. *S. Wherryi* Small in Torreya, xxvi. 66 (1926). *S. caroliniana*, subsp. *Wherryi* (Small) Clausen, l. c. 582 (1939).

What is Actaea alba? (Plate 604). Two clearly defined species of *Actaea* occur in the northeastern states and southern Canada. They are distinguished as follows.

1. A. alba Bigel. in Eaton, Man. ed. 2: 123 (1818) and Fl. Bost. ed. 2: 211 (1824); Hook. Fl. Bor.-Am. i. 27 (1829); Torr. & Gray, Fl. N. Am. i. 35 (1838); and Gray, Britton, Robinson & Fernald and most subsequent authors; not *A. alba* Mill. Dict. ed. 8, no. 2 (1768) nor *A. spicata*, β. *alba* L. Sp. Pl. 504 (1753) nor, nomenclaturally at least, the following, resting upon the latter names: *A. americana* Pursh, α. *alba* Pursh, Fl. Am. Sept. ii. 366

Photo. W. H. Hodge.

Actaea pachypoda: fig. 1, fruiting raceme (dried), × 1, from Nova Scotia.
A. rubra, forma neglecta: fig. 2, fruiting raceme (dried), × 1, from Vermont.

Photo. W. H. Hodge.

RORIPPA ISLANDICA, var. MICROCARPA: FIG. 1, ISOTYPE of Nasturtium palustre, var. microcarpum, × 1, from Amur (2 plants); FIG. 2, fruiting raceme of isotype of *R. islandica*, var. *Fernaldiana*, × 1, from Maine.

Var. HISPIDA: FIG. 3, siliques, × 5, from Idaho, of *Nelson & Macbride*, no. 1318, distributed as *R. terrestris globosa* Nelson and cited by Butters & Abbe as *R. islandica*, var. *glabrata*; FIG. 4, siliques, × 5, from New York; FIG. 5, silique, × 5, from New Mexico, of *Heller & Heller*, no. 3743, cited by Butters & Abbe as *R. islandica*, var. *glabrata*; FIG. 6, tetracarpellate silique, × 5, from Saguenay Co., Quebec; FIG. 7, silique, × 5, from Lake St. John, Quebec; FIG. 8, young tri- or tetracarpellate silique, × 5, from Rhode Island.

R. BARBAREAEFOLIA: FIG. 9, raceme, × 1, of authentic specimen from Amur.

(1814) and *A. brachypetala* DC., α. *alba* DC. Syst. i. 385 (1817). *A. pachypoda* Ell. Sk. ii. 15 (1821); Mackenzie in Torreya, xxviii. 53 (1928). *A. brachypoda* Rydb. Fl. Pr. Pl. 345 (1932), ascribed to Elliott and obviously an error for *A. pachypoda* Ell. —Pedicels in fruit becoming relatively thick, red or reddish; petals slender, mostly truncate; stigma during anthesis broadly sessile; fruits white, capped by the broad sessile purple stigma (whence the colloquial name Doll's Eyes); seeds (3–) 5–10, 4–5 mm. long. Plate 604, fig. 1.

A form of *A. "alba,"* as above defined, has dark-red fruits. This is

A. alba, forma rubrocarpa Killip in House, N. Y. State Mus. Bull. 243–244: 40 (1923).

It seems to be an extreme with darker fruits than in *A. brachypetala* DC., δ *microcarpa* DC. Syst. i. 385 (1817), described from near Boston with "baccis parvis albis subrubellis, pediculis incrassatis."

2. A. rubra (Ait.) Willd. Enum. 561 (1809) and most subsequent authors. *A. spicata*, γ. *rubra* Ait. Hort. Kew. ii. 221 (1789) and many later authors. *A. americana* Pursh and β. *rubra* Pursh, Fl. Am. Sept. ii. 366, 367 (1814). *A. brachypetala* DC., β. *rubra* DC. Syst. i. 385 (1817). *A. longipes* Spach, Hist. Veg. vii. 388 (1839).—Pedicels filiform; petals rhombic-spatulate, tapering to tip; stigma during anthesis slightly elevated above summit of ovary, in fruit contracted and relatively inconspicuous; fruit cherry-red; seeds 10–16, 3–4 mm. long.

The form with white fruits is

A. rubra, forma neglecta (Gillman) Robinson in Rhodora, x. 66 (1908). *A. neglecta* Gillman in Lloyd, Drugs and Medicines, 235 (1884–5). *A. eburnea* Rydb. Mem. N. Y. Bot. Gard. i. 153 (1900). *A. alba* sensu Mackenzie in Torreya, xxviii. 53 (1928) and sensu Rydb. Fl. Pr. Pl. 345 (1932); not Miller nor Bigelow. Plate 604, fig. 2.

That species nos. 1 and 2 are wholly distinct everyone agrees. No. 1, our *Actaea "alba"* (plate 604, fig. 1), is essentially southern, reaching Georgia, Louisiana and Oklahoma at the south and merely entering the southernmost borders of Canada; no. 2, our *A. rubra*, is northern, extending from Labrador to interior Alaska, becoming rare so far south as southern New England, northern New Jersey, southern New York, and westward into the Rocky Mountains. Until Mackenzie positively asserted that the Cornut

plate (which started the name *A. alba* as used unequivocally for a century and three-fourths) was based upon the white-fruited form (forma *neglecta*) of *A. rubra* (PLATE 604, FIG. 2), everything was clear. Now, however, since Mackenzie's assertion (his pp. 52 and 53) that Cornut "very accurately figured" "our baneberry with slender pedicels," our *A. rubra*, forma *neglecta*, and that the latter "should be known by that name [*A. alba*], and . . . the ordinary red-fruited plant should be known as a form," the clarity of the past has suddenly been clouded. Rydberg promptly accepted Mackenzie's unqualified verdict; but, had he taken pains to look up the "very accurate" plate of Cornut, he would have found the fruiting raceme very far from convincing for any form of *A. rubra*, for the latter has the divergent filiform fruiting pedicels (FIG. 2) 1–2.5 cm. long. It is at least diverting that Mackenzie, apparently alarmed at the changes he was proposing, seems not to have been so uncompromisingly literal as in some of his other interpretations, when he proposed and chose a second alternative. Dismissing the plant with thick pedicels (PL. 604, FIG. 1) to which the name *A. alba* had previously been most applied and asserting without qualification that the Cornut plate (our p. 265, FIG. 1) is a "very accurate figure" of the white-fruited plant with slender divergent pedicels, *A. rubra* forma *neglecta* PL. 604, FIG. 2), he forthwith said:

"On the other hand, one can follow nature [as if the abundant white fruits are not natural!] and say that the red-fruited plant is undoubtedly the specific type, and that the first name applied to it (*Actaea rubra*) should be adopted, although published after *Actaea alba*. In this case one would treat the plant of Linnaeus [*A. spicata*, β. *alba* L., based on the Cornut plate] and of Miller [*A. alba* Mill. (1768)] as a form of *Actaea rubra* [*A. rubra* (Ait.) Willd. (1809)]." And he concluded: "My own preference is for the second course here indicated"!

Rydberg, although accepting the name *Actaea alba* for the plant with white fruits on slender pedicels, did not follow Mackenzie's preference to treat it as a form of the later-published *A. rubra*. He maintained them both as species, one with the white fruit "9–12 mm. long" and with seeds "about 4 mm. long," the other with red fruit "10–12 mm. long" and seeds

"about 3 mm. long." Measurement of many seeds of each series shows them all the way from 3 to 4 mm. in length.

The whole difficulty arose from misunderstanding from the first of Cornut's plate, Cornut, Can. Pl. t. 77 (our p. 265, FIG. 1), which, as emphasized, Mackenzie considered as a "very accurate" figure of *Actaea rubra,* forma *neglecta* (PL. 604, FIG. 2). In publishing *A. spicata,* β. *alba* in 1753 Linnaeus rested the variety, without new description, wholly on the plate of Cornut (our p. 265, FIG. 1) and upon the figure in Morison's Historia, ii. fol. 1, t. 2, fig. 7 (our p. 265, FIG. 2), which was obviously copied directly from Cornut. In publishing *A. alba* in 1768 Miller gave the briefest of diagnoses and cited Morison (therefore by inference Cornut). Linnaeus had no material and Mackenzie states that there is nothing preserved to stand for Miller's plant. We, therefore, get back, automatically, to the Cornut plant (our p. 265, FIG. 1) as the only clear basis for *A. alba;* and that that is *not* a clear basis for any American species is apparent. The first definite differentiation of our two species was by Jacob Bigelow, first in Eaton's Manual (1818), later and very completely in Florula Bostoniensis, ed. 2 (1824). That *A. alba* sensu Bigelow and later authors was also *A. pachypoda* Ell. everyone has recognized; but the interpretation by Mackenzie and, following him, by Rydberg, that *A. alba,* as typified by the Cornut plate, is the slender-pedicelled *A. rubra,* forma *neglecta* (PL. 604, FIG. 2) is unique.

Cornut's *Canadensium Plantarum Historia* (1635) had an unfortunately misleading title, for, as repeatedly pointed out, it contains many plants which, at that date, had surely never seen Canada. Some, as indicated in the text, were admittedly not Canadian (*Bugula odorata lusitanica, Cyclamen orientale, Arundo indica,* etc.); others were wrongly supposed to be Canadian. To the latter group belongs, I think, the illustration of *Aconitum baccis niveis* [*et rubris*] which was the basis of *Actaea spicata,* β. *alba* L. and the only identifiable basis of *Actaea alba* Mill. Mackenzie (l. c. 53) had no doubt of the identity of Cornut's fruiting raceme with the American *A. rubra,* forma *neglecta,* saying: "Both the illustration by Cornut and the illustration by Morison represent a plant with slender pedicels and having an ovoid raceme and ovoid or ellipsoid berries. The

only definite points to go on with Miller are his phrase 'racemo ovato' and his reference to Morison's figure. In other words, Cornut, Morison, Linnaeus and Miller all seem to have been dealing solely with *Actaea rubra*, f. *neglecta*." Had Mackenzie read Cornut's latin text he would have found some contradiction to the ellipsoid fruits of the plate in Cornut's statement that upon maturing the ovary becomes orbicular in outline. There is also food for thought in the statement by Cornut that the fruits may be red ("Baccae plerumque variant: vidimus enim etiam rubellas"). Incidentally, if one examines good material and illustrations of the European *Actaea spicata* L., described (by Moss, for instance, in the Cambridge British Flora, iii. 152) with "*Pedicels* about as long as the flowers" and with "*Fruit* . . . elliptical," he will have before him the species which was illustrated by Cornut! In order to show all the species which have been called *Actaea alba*, I have asked Mr. Hodge to reproduce the figures of Cornut (p. 265, fig. 1) and of Morison (fig. 2); a representative fruiting raceme (pl. 604, fig. 1) of *A. alba* Bigel. and most later authors (*A. pachypoda* Ell.), from Granville, Nova Scotia (*Bartram & Long*, no. 23,862); a typical fruiting raceme (pl. 604, fig. 2) of *A. rubra*, forma *neglecta*, from Willoughby, Vermont, July 11, 1898 (*Kennedy*); and reproductions from European plates of *A. spicata*: p. 265, fig. 3 showing a flowering raceme from Moss, Cambr. Brit. Fl. iii. pl. 163; fig. 4, a fruiting inflorescence from Schlechtendal, Langethal & Schenk, Fl. Deutschl. ed. 7, xi. t. 1087; fig. 5, a fruiting raceme from Sturm, Fl. Deutschl. ed. 2, v. t. 39. That these figures of *A. spicata* are much closer to the plate of Cornut than are the two American species which have long been identified with it is apparent. To me it seems clear that Cornut had mixed material; his plate was obviously made from the European *A. spicata*, but his phrase "baccis niveis" and possibly some others came from American material he had received. At best the basis of *A. alba* Mill. was confused and I am taking up for *A. alba* sensu Bigel. and most later authors the unequivocal *A. pachypoda* Ell. This necessitates the following transfer.

Actaea pachypoda Ell., forma **rubrocarpa** (Killip), comb. nov. *A. alba*, forma *rubrocarpa* Killip in House, N. Y. State Mus. Bull. 243–244; 40 (1923).

Actaea spicata: fig. 1, portion of the Cornut plate of Aconitum baccis niveis [et rubris], basis of A. spicata, β. alba L. and of A. alba Mill.; fig. 2, portion of Morison's figure of Christophorinana Americana, cited by Linnaeus under A. spicata, β. alba; fig. 3, flowering raceme, × 1, after *Moss;* fig. 4, fruiting raceme, × 1, after *Schlechtendal, Langethal & Schenk;* fig. 5, fruiting raceme, × 1, after *Sturm.*

CIMICIFUGA RACEMOSA (L.) Nutt., forma **dissecta** (Gray), comb. nov. *C. racemosa*, var. *dissecta* Gray, Man. ed. 6: 47 (1890).

DESCURAINIA PINNATA (Walt.) Britton, var. **brachycarpa** (Richardson), comb. nov. *Sisymbrium brachycarpum* Richardson in Frankl. 1st Journ. App. 744 (repr. 16) (1823). *S. canescens* Nutt., var. *brachycarpum* (Richardson) Wats. Bibl. Index, 69 (1878). *S. pinnatum*, var. *brachycarpum* (Richardson) Jepson, Fl. Calif. ii. 46 (1936). *D. pinnata*, subsp. *brachycarpa* (Richardson) Detling in Am. Midl. Nat. xxii. 509 (1939). *D. pinnata brachycarpa* (Richardson) F. C. Gates in Trans. Kansas Acad. Sci. xlii. 137 (1940), the rank not definitely stated but the indecisive statement made on p. 135: "The trinomial in botany is usually referred to as a variety, although the designation subspecies would appear to be more reasonable."

The International Rules of Botanical Nomenclature quite reasonably recommend "not to publish a new name without clearly indicating whether it is the name of a family or a tribe, a genus or a section, a species or a variety; briefly, without expressing an opinion as to the rank of the group to which the name is given" (Recommendation xxi.). Furthermore, names or combinations put forward without clear statement of rank but with a suggestion that they belong in one or the other of two ranks (others besides the publishing author to make the decision), are invalid under the generally accepted International Rules. At the Amsterdam Congress (1935) the rule was accepted that "A name of a taxonomic group is not validly published unless it is *definitely accepted* by the author who publishes it. A name proposed provisionally (*nomen provisorium*) in anticipation of the eventual acceptance of a group, or of a particular circumscription, position or rank of a given group . . . is not validly published."—See Sprague in Journ. Bot. lxxiv. 75 (1936). This rule was adopted to guard against names put out in such indefinite status that the author leaves alternatives open in interpreting his real meaning.[1]

[1] The paper, *New Forms and Nomenclatorial Combinations in the Kansas Flora*, in Trans. Kansas Acad. Sci. xlii. 135–138 (1939, perhaps really 1940, the volume received at the Gray Herbarium March 4, 1940, the reprint March 19, 1940) contains several combinations which certainly are not new.

Descurainia intermedia (Rydberg) F. C. Gates (late 1939 or early 1940) is antedated by *D. intermedia* (Rydb.) Daniels in Univ. Mo. Studies, Sci. ser. i. 289 (repr. 147) (1907). *D. Richardsoniana* ("Sweet") F. C. Gates, said to be based on *Sisymbrium "Richardsoniana"* Sweet, Hort. Brit. ed. 2: 30 (1830), error for *S. Richardsoni* Sweet, is *D. Richardsonii* (Sweet) O. E. Schultz in Engler, Pflanzenreich, iv^{105}. 318 (1924). *Fraxinus pennsylvanica campestris* (Britton) F. C. Gates (1939 or 1940) was published as new by the same author also in 1938; *Apocynum cannabinum album* (Greene) F. C. Gates would have been a new

THE EASTERN AMERICAN VARIETIES OF RORIPPA ISLANDICA (PLATE 605). In 1928 I pointed out[1] that the plants then passing as *Rorippa* (or *Nasturtium* or *Radicula*) *palustris* should take an older specific epithet and should be called *Rorippa islandica* (Oeder) Schinz & Thellung. At that time I showed that the two common plants of North America are very different from the true Old World *R. islandica*. Subsequently[2] I suggested that the basic name, *Sisymbrium islandicum* Oeder, Fl. Dan. tab. 409 (1768), was invalid because published with a mark of interrogation and in a work partly polynomial in nomenclature; and, quoting European correspondents, I pointed out that the combination *Rorippa islandica* is carried back to Borbás. Later authors have, however, shown that *Sisymbrium islandicum* was validated, before any other specific epithet was published, by Murray in Nov. Com. Gott. iii. 81 (1773).

In the Journal of Botany, lxxvii. (Dec., 1939), Dr. T. A. Sprague made the characteristically British argument that the binomials of Oeder in Flora Danica, iii. are not invalidated by the rule adopted at Cambridge in 1930, as proposed by Sprague and his British associates: "Art. 68. Specific epithets are illegitimate in the following cases and MUST BE REJECTED [emphasis mine] . . . (4) When they were published in works in which the Linnean system of binary nomenclature WAS NOT CONSISTENTLY EMPLOYED." I am reproducing from Flora Danica, iii. a few treatments of species (p. 269). To him who runs it is sufficiently clear that "binary nomenclature was not consistently employed." If it had been, on the sophisticated basis argued by Sprague (that Oeder gave somewhere amidst the polynomial descriptive phrases emphasis to a Linnean binomial by use of roman type), why did Oeder not use Roman type somewhere under the text of tab. DXXIII? The polynomial phrases wholly in italics are exactly

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combination only if the trinomials meant subspecies, for as a variety it is *A. canabinum*, θ *album* (Greene) Béguinot & Belosersky, Rev. Monogr. del Gen. Apocynum, 105 (1913). *Astragalus longifolius* (Pursh) F. C. Gates has the same basinym as *A. longifolius* (Pursh) Rydberg, Fl. Neb. pt. 21: 47 (1895). *Gaura coccinea parviflora* (Torr.) F. C. Gates might have been a new combination if the author had unequivocally announced it as a subspecies. As a varietal name it is identical with *G. coccinea*, var. *parviflora* (Torr.) Rickett in Kew Bull. 1934: 57 (1934). *Rhus Toxicodendron Negundo* (Greene) F. C. Gates (1939 or 1940) was also published by the same author in 1938.

[1] RHODORA, xxx. 132 (1928).

[2] RHODORA, xxxi. 17 (1929).

those used by Linnaeus in 1753 as his bases for the binomial Lamium purpureum. Again, by Sprague's interprepation, binomial nomenclature was consistently employed by Oeder when, under tab. CCCLXXVI, he buried as effectively as possible the Linnean binomial Ranunculus aquatilis as a synonym under his third polynomial citation. In fact, a large proportion of the Linnean binomials cited by Oeder in this volume are given only in synonymy or in the 2nd or 3d string of polynomials. How, furthermore, can it be maintained that, in the explanation of the beautiful illustrations of the four wholly different mosses in tab. DXXXVIII, "the Linnean system of binary nomenclature was . . . consistently employed"? Three of the four species (75%) are under completely italicized polynomials, only the fourth having roman type employed for the "trivial" name.

Article 68 (4) of the International Rules was Art. 72 (3) of the Proposals of the Sub-Committee on Nomenclature of the British Botanical Conference (1929), presented to the International Botanical Congress of 1930 in "An attempt to remove various sources of ambiguity in the Rules" (p. 5). By many of those who supported the British proposal it was inferred that the rule was essentially clear; by Sprague's latest interpretation it is evident that to him, at least, its meaning is essentially *ambiguous*. Many of us who have long fought for international agreement in plant nomenclature and who still believe in such an ideal can see only disagreement if those in positions of authority in this technical and to most of us tedious, though unescapable evil, allow themselves to become advocates of violation of both the spirit and the letter of the rules. The difficulties are sufficient without seeking to increase them.

In a recent number of Rhodora (xlii. 25–32) Butters & Abbe correctly take up *Rorippa islandica* (Oeder ex Murr.) Borbás for the inclusive species and they there honor me by describing as *R. islandica*, var. *Fernaldiana* the plant which I had mistakenly called *Rorippa hispida* (Desf.) Britton, var. *glabrata* Lunell, and which Victorin, following my misidentification of Lunell's plant, had called *R. palustris*, var. *glabrata* (Lunell) Victorin. Butters & Abbe publish a photograph (their plate 588) of Lunell's type, showing it to be very close to *R. islandica*, var. *hispida* (Desv.) Butters & Abbe. They thus have cleared the identity

TAB. CCCLXXVI.

Ranunculo ſive Polyanthemo aquatili albo affine millefolium maratriphyllum fluitans. J. B. II. 774.
Ranunculus aquatilis, albus, fluitans, Peucedani foliis. Herm. Lugdb. 516.
Ranunculus caule fluitante, petiolis unifloris, foliis capillaceis, longiſſimis, laciniis parallelis. Hall. 1161. Rupp. Jen. Hall. 104. *Ranunculus* aquatilis d. Linn. Sp. pl. 782.
Locus. In fluentis rapidioribus, e. g. fluvio *Hunte* prope *Dödlingen.*

TAB. CCCXC.

Saxifraga foliis caulinis palmatis petiolatis, caule bulbifero ſubramoſo & multifloro. an S. *bulbifera?*
Locus. Ex Islandia attulit Clar. J. G. Kœnig, lectam prope *Adner See, Saide Fiell, Hraffntinna Fiel* prope *Kraffle.*

TAB. CCCCIX.

Siſymbrium, (islandicum?) *ſiliquis brevibus declinatis, foliis lyratopinnatis, foliolis ovalibus dentatis.*
Locus. In horto nobis luxuriat natum e ſeminibus a Dno *Kœnig* ex Islandia allatis, ubi creſcit prope ſcaturigines calidæ, & alibi locis udis. Vereor autem ut a *S. ſylveſtri* ſatis differat.

TAB. DXXIII.

Lamium purpureum fœtidum folio ſubrotundo. C. B. P. 230. Kyll. Vir.
Lamium, purpureum, foliis cordatis obtuſis petiolatis. Linn. S. N. 393. Hall. 272.
Locus. Vulgatiſſum in cultis & fimetis.

TAB. DXXXVIII.

1. *Bryum, foliis capillaribus, capſulis ovalibus erectis in pedunculis brevibus.*
   In Saxis Norvegiæ.
2. *Bryum, foliis ſetaceis curvatis, capſulis erectis obtuſe ovatis, capitello oblique roſtrato, apophyſi capitulo ſubjecta.*
   In huma irrigua atra ſchiſti montis *Eckeberg* prope Chriſtiania, agnoſcitur calyptra nigra in capſula viridi, diverſum a *B. viridulo.*
3. *Bryum, foliis ſubulatis, capſulis ſphæricis ſtriatis in pedunculis brevibus lateralibus.*
   In alpibus Norvegiæ.
   cf. *Bryum foliis mollibus ſubulatis, ſetis breviſſimis alaribus, capſulis ovatis.* Hall. 1802. t. 46. f. 8. Enum. 1128.
4. *Mnium*, cirrhatum, *foliis arefactione revolutis.* Linn. S. N. 700. Dill. t. 48. f. 42. Enum. 995. cf. Hall. 1786.
   In ſylvis & ad ſepes.

Some Treatments of Species by Oeder in Flora Danica, vol. iii, showing that "binary nomenclature was not consistently employed" in that Volume.

of Lunell's variety, but in doing so they seem inadvertently to have overlooked some points which would have greatly changed some of the varietal combinations they published.

Taking advantage of the printing of their study of the American varieties of *Rorippa islandica* and their clarification of the identity of the Lunell plant, *R. islandica*, var. *glabrata* (Lunell) Butters & Abbe, I undertook the needed revision of the genus for the Gray's Manual area; but, unfortunately, I am unable to maintain either var. *glabrata* or the very gratifying name var. *Fernaldiana*. My reasons follow.

Rorippa islandica, var. *Fernaldiana* is well represented in the Gray Herbarium by many sheets from Japan, Amur and Manchuria. They are so very unlike typical *R. islandica* (with very thin deeply pinnate cauline leaves and ellipsoid arcuate siliques) that it seemed most improbable that the acute students of the eastern Asiatic floras should not have detected the difference. They did detect it as early as 1861, when Regel beautifully described the plant in his Tentamen Florae Ussuriensis, Mém. Acad. Imp. Sci. St.-Pétersb., sér. 7, iv. no. 4: 20 (1861), as *Nasturtium palustre*, var. *microcarpum*. To be sure, N. Busch, Fl. Sib. et Orient. Extr. xxv. Crucif. 203 (1915), took up *N. palustre*, var. *microcarpum* in the sense of his *N. palustre*, var. *brevisiliquum* N. Busch, Rhoead. 326 (1909) and illustrated as var. *microcarpum* siliques of the latter, which to me are very characteristic fruits of var. *hispidum* (Desv.) Butters & Abbe, and the latter authors specially comment that "Some of the fruits of Siberian plants figured by Busch under the name '*Nasturtium palustre* var. *microcarpum* Rgl.' are very similar to those of var. *glabratum* . . . This combination, published, according to Busch in 1861, of course greatly antedates Lunell's, but from the very meager information available it is impossible to say whether the plants are in all respects identical. It seems best therefore for the present to retain Lunell's varietal name."

It is too bad that Butters & Abbe accepted Busch's misidentification of *Nasturtium palustre*, var. *microcarpum*.[1] The original description could easily have been secured and a probable isotype

[1] Busch also erred (his p. 207) in treating as *N. hispidum* (Desv.) DC. the very large-fruited *Camelina barbareaefolia* DC. or *Rorippa barbareaefolia* (DC.) Kitagawa, which he correctly describes as having fruits up to 9 mm. long and 5 mm. broad—measurements never met by *N. hispidum* or *R. islandica*, var. *hispida*.

of Regel's variety was quickly available for the asking. Here is Regel's original account:

58. **Nasturtium palustre** D. C. **var. microcarpum:** caule tenui deinde ramosissimo; fol. lyratis v. pinnatifidis v. subintegris; floribus luteis; siliquis parvis linearibus v. oblongo-ellipticis, nec turgidis.

Am obern Ussuri bei Damgu und der Mürenmündung, auch am Sungatschi.

Siliquae parvae, pedicello plerumque breviores, saepissime in paniculam ramosissimam densam congestae, in pedicello patentissimo adscendentes.

Liegt uns auch nebst der vorhergehenden Form in Examplaren vor, die Maximowicz am Amur sammelte.

Fortunately a sheet of the Maximowicz collection from Amur, which Regel said was representative of his *Nasturtium palustre*, var. *microcarpum*, is in the Gray Herbarium. It is a relatively small plant, but other eastern Asiatic specimens quite like it in foliage and fruit are several times as tall. PLATE 605, FIG. 1, is this authentic specimen, × 1, of *N. palustre*, var. *microcarpum* Regel; FIG. 2 is a small portion of fruiting inflorescence, × 1, from an isotype of *Rorippa islandica*, var. *Fernaldiana*. I do not see the difference. I am, consequently, forced into the seemingly ungracious necessity to reduce var. *Fernaldiana* to

RORIPPA ISLANDICA (Oeder ex Murr.) Borbás, var. **microcarpa** (Regel), comb. nov. *Nasturtium palustre*, var. *microcarpum* Regel in Mém. Acad. Imp. Sci. St.-Pétersb. sér. 7, iv. no. 4 (Tent. Fl. Ussur.), 20 (1861). *R. islandica*, var. *Fernaldiana* Butters & Abbe in RHODORA, xlii. 28 (1940).

The only possibility which may make it allowable to retain the name *Rorippa islandica*, var. *Fernaldiana* is the doubtful one, that some very recent European student has made the combination *R. islandica*, var. *microcarpa* for a wholly different plant. In 1892 Beck von Mannagetta, apparently not cognizant of the earlier variety of Regel (under *Nasturtium*) published a form of the pinnate-leaved European *R. palustris*, with more ellipsoid siliques at most 4 mm. long, as *R. palustris*, β. *microcarpa* G. Beck, Fl. Nied.-Österr. ii[1]. 466 (1892). This has later become *Radicula palustris*, var. *microcarpa* (G. Beck) C. E. Britton in Bot. Exch. Cl. Brit. I Rep. for 1919: 806 (1920); also *Rorippa islandica*, forma *microcarpa* ascribed (erroneously) to Beck by Thellung in Hegi, Ill. Fl. Mitt.-Eu. iv[1]. 317 (1919). I have not

found Beck's varietal name for the short-fruited typical *Rorippa islandica* used in that rank under *R. islandica;* if it has been properly transferred, with Beck's plant as the type, then var. *Fernaldiana* will automatically have to be taken up.

Even the varietal names here used, var. *microcarpa,* starting in 1861, and var. *hispida,* first used in varietal rank in 1856, are liable to upset. Dr. Hara calls my attention to *Nasturtium palustre,* vars. *majus* and *minus* Ledeb. Fl. Alt. iii. 8 (1831). The characterizations of Ledebour do not make clear whether his plants belong to one or both of the common varieties which occur in Asia and cross North America. When Ledebour's types (at Leningrad) can be properly studied a shifting of varietal combinations may necessarily result.

In their paper Butters and Abbe discuss at great length the type of *R. islandica* (Oeder ex Murr.) Borbás, var. *glabrata* (Lunell) Butters & Abbe, and set off under this name a selected series of five specimens from a somewhat unnatural area, North Dakota, Idaho and New Mexico, because, among other characters, "Most of the specimens of this entity have a large number of tricarpellate and tetracarpellate siliques." They had earlier (p. 26) stated that var. *glabrata* was originally thought by Lunell, when he published it as *R. hispida,* var. *glabrata,* to be "a glabrous form of the latter [*R. hispida,* i. e. *R. islandica,* var. *hispida*], which is evidently very close to its true status." It seems to me that they might, happily, have rested the case there. They based their deductions regarding the semi-cosmopolitan *R. islandica* and its many varieties upon measurements of only 93 specimens of the whole series. Had they seen a much greater representation from the whole range it is probable that they would have found their western var. *glabrata* not separable from great numbers of eastern specimens of var. *hispida* (Desv.) Butters & Abbe. I have before me 204 sheets of this single variety. The type of var. *glabrata* is closely matched or approached by material from Newfoundland (*Fernald & Wiegand,* no. 5486), Maine (Foxcroft, *Fernald,* type of *R. palustris,* var. *hispida,* forma *inundata* Victorin; East Machias, August 7, 1935, *Knowlton*), Ontario (Bruce Co., *Krotkov,* no. 7481) and Ohio (Oberlin, July 13, 1894, *W. M. Dick*). I have before me both numbers from Idaho cited by Butters & Abbe under their var. *glabrata.*

One, the type number of *R. terrestris globosa* Nelson, is too young for proper study but the other, *Nelson & Macbride*, no. 1318, was also distributed as *R. terrestris globosa* Nelson. In foliage this is matched or closely approached by so many plants (for instance *Abbe*, no. 1206 from Fog Island, Saguenay Co., Quebec) from Newfoundland, Quebec, Nova Scotia, New England, New York, Michigan and Indiana that their enumeration would be cumbersome. Similarly the small (2.5–4 mm. long, 1.7–2.2 mm. thick) ellipsoid to rounded-obovoid siliques of no. 1318 (FIG. 3) are so closely matched by fruits of specimens from Quebec, Maine, New Hampshire, Vermont, Massachusetts, Connecticut, New York (FIG. 4), Pennsylvania, Virginia and Florida, that I can merely offer the loan of these sheets to any who are skeptical. The New Mexican material picked out by Butters and Abbe as their var. *glabrata* is *Heller & Heller*, no. 3743. The very full sheet in the Gray Herbarium shows nothing unusual in foliage. It differs from the type of the variety and from *Nelson & Macbride*, no. 1318 in having much larger siliques (FIG. 5), up to 5 mm. long and 4 mm. thick. But plenty of eastern specimens of var. *hispida* have fruits meeting or closely approximating these dimensions (Newfoundland: *Fernald & Wiegand*, no. 5487. Quebec: *St. John*, no. 90,493, with tri- or tetra-carpellate siliques (FIG. 6); *W. F. Wight*, no. 269 (FIG. 7). Maine: Houlton, August 26, 1897, *Fernald;* and Massachusetts, Rhode Island and Connecticut, several specimens, including one from Rhode Island, *Thurber* (FIG. 8), upon which Asa Gray made the note "3–4-carpellary!", this forming the basis of the comment by Watson in Gray, Syn. Fl. i[1]. 148 (1895), under *Nasturtium terrestre*, var. *hispidum*, "*Tetrapoma pyriforme*, Seem.[1] . . . is a very closely allied form with globose or pyriform pods, which are often abnormal in the number of carpels (2 to 6) and cells, as occasionally occurs also in var. *hispidum*").

In view of the ready matching of the specimens cited as representing *Rorippa islandica*, var. *glabrata* by foliage and siliques of plants of var. *hispida* from the eastern border of the continent and in view of the occasional occurrence of 3 or 4 carpels in the eastern plant, I find myself unable to subscribe to var. *glabrata* as a well defined variety of the interior.

[1] *Rorippa barbareaefolia* (DC.) Kitagawa in Journ. Jap. Bot. xiii. 137 (1937); A. E. Porsild in RHODORA, xli. 232 (1939).

As already noted N. Busch confused the small-fruited *Rorippa islandica*, var. *hispida* (*R. hispida* (Desf.) Britton), the fruits measuring, according to the table of Butters & Abbe, only 2.2–5.5 mm. long and 1.7–3.7 mm. broad, with the large-fruited *R. barbareaefolia*, with fruits, as correctly stated by Busch, up to 9 mm. long and 5 mm. broad. This species of northeastern Asia and Pacific North America, east to Yukon and south to western Oregon, not only has the very large fruits commonly 3–4-carpellary, but its short and thick style without dilated stigma is characteristic. In well developed plants the fruiting racemes are so like those of *Camelina* that it is easy to see why DeCandolle originally placed the plant in that genus, as *Camelina barbareaefolia*. FIG. 9 is a fruiting inflorescence, × 1, of a typical Asiatic plant from Amur, *Maximowicz*. This species, which eventually may have to be considered a very extreme variety of *R. islandica*, with *R. islandica*, var. *occidentalis* (Watson) Butters & Abbe forming the transition, is here noted because two sheets from the northeastern shore of the Gulf of St. Lawrence in Quebec apparently belong to it. These are from grassy shore, Ile Bayfield (Sandy Island), Archipel de St. Augustin, July 21, 1915, *St. John* in Herb. Geol. Surv. Can. no. 90,492; rivages calcaires, luxuriant, Ile Tête-à-la-Baleine, Archipel de Mingan, 12 août, 1925, *Victorin & Rolland*, no. 21,439. These are particularly interesting as adding another to the identities in the flora of the Gulf of St. Lawrence and of the northern Pacific region.

In PLATE 605, FIG. 1 is a representative (ISOTYPIC?) collection, × 1, of *Rorippa islandica*, var. *microcarpa* (Regel) Fernald, from Amur, *Maximowicz*, cited by Regel as characteristic; FIG. 2, fruiting branch, × 1, from ISOTYPE of var. *Fernaldiana* Butters & Abbe, from Fort Fairfield, Maine, July 6, 1893, *Fernald*; FIG. 3, siliques, × 5, of small-fruited extreme of var. *glabrata* (Lunell) Butters & Abbe (cited by them), from Twin Falls and Shoshone Falls, Idaho, *Nelson & Macbride*, no. 1318; FIG. 4, *siliques*, × 5, of small-fruited extreme of var. *hispida* (Desv.) Butters & Abbe, from DeKalb, New York, *Phelps*, no. 514; FIG. 5, silique, × 5, from large-fruited extreme of var. *glabrata* (cited by Butters & Abbe), from Santa Fé, New Mexico, *Heller & Heller*, no. 3743; FIG. 6, tri- or tetracarpellate silique, × 5, large-fruited extreme of var. *hispida*, from Romaine, Lagorgendière, Saguenay Co., Quebec, *St. John* in Herb. Geol. Surv. Can., no. 90,493; FIG. 7, silique, × 5, of large-fruited extreme of var. *hispida*, from Lake St. John, Quebec, *W. F. Wight*, no. 269; FIG. 8, young tri- or tetracarpellate silique, × 5, of var. *hispida*, from Rhode Island, 1846, *Thurber*; FIG. 9, raceme, × 1, of authentic *R. barbareaefolia* (DC.) Kitagawa, from Amur, *Maximowicz*, identified by Bunge.

Varieties of Rubus nutkanus. In 1935 I fell into the nomenclatural trap of taking up for *Rubus nutkanus* Moçino ex Seringe in DC. Prodr. ii. 566 (1825) the earlier name *R. parviflorus* Nutt. Gen. i. 308 (1818), overlooking the very simple fact that the latter is a later homonym of *R. parviflorus* L. Sp. Pl. 1197 (1753). Nuttall's later epithet had been perpetuated by Rydberg in *Rubacer parviflorum* (Nutt.) Rydb. in Bull. Torr. Bot. Cl. xxx. 274 (1903) and in N. Am. Fl. xxii. 426 (1913) and by Greene in *Bossekia parviflora* (Nutt.) Greene, Leaflets, i. 211 (1906), neither of them noting that the basic binomial was a later homonym. I have been informed that the varieties are merely trivial forms which may be found anywhere within the range of the species. This may sometime prove to be the case, but until var. *velutinus* is found more generally than along the Pacific slope in California, var. *Nuttallii* somewhere besides the region of the upper Great Lakes, var. *scopulorum* more generally outside the Rocky Mountain area, var *bifarius* more generally within the Rocky Mountain area, and var. *parvifolius* north or northwest of Utah and New Mexico, I am constrained to retain them as geographic varieties. Under *Rubus nutkanus* the varieties have the following names.

R. nutkanus Moçino ex Seringe in DC. Prodr. ii. 566 (1825). *R. parviflorus*, var. *grandiflorus* (as *grandiflora*) Farwell in Am. Midl. Nat. xi. 263 (1929); Fernald in Rhodora, xxxvi. 281, pl. 265, fig. 4 and map 20 (1935).

Var. **bifarius** (Fern.), comb. nov. *R. parviflorus*, var. *bifarius* Fernald, ibid. 280 and map 19 (1935).

Var. **hypomalacus** (Fern.), comb. nov. *R. parviflorus*, var. *hypomalacus* Fernald, ibid. 277, pl. 364, fig. 5 and map 17 (1935).

Var. **heteradenius** (Fern.), comb. nov. *R. parviflorus*, var. *heteradenius* Fernald, ibid. 279, pl. 364, figs. 6 and 7 and map 279 (1935).

Var. Nuttallii Torr. & Gray, Fl. N. Am. i. 450 (1840). *R. parviflorus* Nutt. Gen. i. 308 (1818), not L. (1753). *R. nutkanus*, var. *parviflorus* (Nutt.) Focke in Bibl. Bot. xvii^{72}. 124 (1911). *R. parviflorus*, var. *genuinus* Fernald, ibid. 277, pl. 364, figs. 1 and 2 and map 15 (1935).

Var. velutinus (Hook. & Arn.) Brewer, Bot. Calif. i. 172 (1876). *R. velutinus* Hook. & Arn. Bot. Beech. Voy. 140 (1832), not Vest (1823). *R. parviflorus*, var. *velutinus* (Hook. & Arn.) Greene in Bull. Torr. Bot. Cl. xvii. 14 (1890); Fernald, ibid. 277,

pl. 364, figs. 3 and 4 and map 16 (1935). *Rubacer tomentosum* Rydb. in Bull. Torr. Bot. Cl. xxx. 274 (1903).

Var. scopulorum Greene ex Focke in Bibl. Bot. xvii[72]. 124 (1911); Fernald, ibid. 283, pl. 365, fig. 5 and map 21 (1935).

Var. parvifolius Gray, in Mem. Amer. Acad. ser. 2, iv. (Pl. Fendl.), 42 (1849). *R. parviflorus*, var. *parvifolius* (Gray) Fernald, ibid. 284, pl. 365, figs. 1–3 and map 22 (1935).

Rubus, subg. Eubatus, § **Persistentes,** nom. nov. § *Triviales* Rydb. in N. Am. Fl. xxii. 430 and 435 (1913), non P. J. Muell. in Flora (1858), 176.

The sectional name *Triviales* of P. J. Mueller (1858) for the trailing and pruinose brambles (*R. caesius* L., and others) of Europe, necessitates a new name for our non-pruinose southern dewberries with evergreen or persistent firm glabrous leaves and variously glandular but otherwise glabrous canes.

(*To be continued*)

An Extension of the Range of Rynchospora macrostachya.—In 1908, Dr. M. L. Fernald[1] gave the distribution of *Rynchospora macrostachya* Torr., in New England, as in Massachusetts, Rhode Island, and Connecticut. Blake[2] listed the known stations for the plant in 1913, and from his report, the northernmost extensions appear to be at Braintree and near Amherst, Massachusetts. Peattie,[3] in 1922, reported stations for this plant in south-central Michigan. In 1937, Fernald[4] reported the known distribution on the Atlantic Coastal Plains, and gave isolated locations inland. No stations for the plant are reported for New England north of Massachusetts.

On September 8, 1938, the writer collected *Rhynchospora macrostachya* in York, York County, Maine. There were several hundreds of the plants scattered over a sheltered pond of several acres, which varies in depth from several feet to dryness. A specimen has been forwarded to Gray Herbarium, *Neal*, No. 2084.—Oliver M. Neal, Jr., Michigan State College.

[1] Fernald, Rhodora **10**: 137, 1908. [2] Blake, Rhodora **15**: 19, 1913.
[3] Peattie, Rhodora **24**: 87, 1922. [4] Fernald, Rhodora **39**: 483, 1937.

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Rhodora

JOURNAL OF

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Vol. 42. August, 1940. No. 500.

SOME PLANTS RECENTLY FOUND IN THE COASTAL PLAIN OF MARYLAND

A. V. Smith

The following plants have recently been collected by the writer while botanizing on the Coastal Plain of Maryland and adjacent Delaware and Virginia. The records are from Wicomico, Worcester, Prince George's, and Anne Arundel Counties, of Maryland; Sussex County, Delaware; Accomac County, Virginia. One species is recorded from the District of Columbia, a little west of the Coastal Plain.

Some of the plants noted are common in other provinces,—particularly in the Piedmont Plateau of Maryland, but represent isolated colonies on the Coastal Plain. Others of the plants are of interest as uncommon pine-barren species, as new county records, or as species near their range-limits.

Ptychomitrium Drummondii Sulliv. This southern moss occurs on the trunks of trees and even on old roofs in southern Delaware and adjacent Maryland. Dr. A. J. Grout has informed the writer that this appears to be an extension of range northward from Virginia and Tennessee.

Buxbaumia aphylla L. This moss of such unusual appearance and supposed rarity is surprisingly common on bare soil in pine woods of eastern Maryland and southern Delaware.

Hypnum crista-castrensis L. This moss is said to be at its best when growing on rotten wood in cool mountain forests. That it does venture into the Coastal Plain is attested by a small colony in a damp depression in pine woods near Millersville, Anne Arundel County.

Dryopteris cristata (L.) Gray. On the Eastern Shore of Maryland the commonest swamp ferns are the chain ferns, the cinnamon fern, and the royal fern. A little of this *Dryopteris* occurs at the edge of a swamp about three miles north of Salisbury, Wicomico County, apparently the only known station in southeastern Maryland.

Dryopteris marginalis (L.) Gray. This fern is common enough elsewhere but is a rarity on the Eastern Shore. The writer recently found one plant growing in rich woods about eight miles southwest of Salisbury.

Osmunda Claytoniana L. During the summer of 1939 the writer found three plants of this fern growing in rich woods near Wattsville, Accomac County, Virginia, apparently many miles from any other known station.

Ophioglossum vulgatum L. var. pycnostichum Fernald. A small colony of this plant is to be found in rich woods about one mile north of Girdletree, Worcester County, Maryland.

Lycopodium clavatum L. A little of this clubmoss occurs in a damp hollow near Millersville, Anne Arundel County.

Lycopodium lucidulum Michx. This plant is occasional in damp spots in woods of eastern Maryland and southern Delaware. One colony is near Snow Hill, Worcester County.

Manisuris rugosa (Nutt.) Ktze. This southern pine-barren species has not been found in Maryland but has long been known from southern Delaware. The writer recently found an apparently new Delaware station, about one mile north of Georgetown, Sussex County. Unfortunately, the area is being converted into a dump heap, and the destruction of a fine colony of the plant seems inevitable.

Andropogon ternarius Michx. This grass is very common on the lower Eastern Shore and in southern Delaware. West of the Chesapeake Bay it appears to be at its known northern limit at Collington, Prince George's County, Maryland.

Arundinaria tecta (Walt.) Muhl. The small cane reaches its known northern limit at the well-known station at Stony Run, Anne Arundel County. The species appears to be absent east of the Chesapeake Bay. The writer has found a new station near Glenburnie, Anne Arundel County, not so far north, however, as the Stony Run station.

Rhynchospora Torreyana Gray. This uncommon pine-barren species occurs in a low clearing in Wicomico County, about six miles southeast of Salisbury.

Veratrum viride Ait. A large colony of this species makes a fine early spring display in a swamp about five miles south of Berlin, Worcester County.

Lachnanthes tinctoria (Walt.) Ell. The red-root appears to be absent from Maryland but is known from a few places in southern Delaware. The writer has found the species growing abundantly at the same station given above for *Manisuris*.

Pogonia ophioglossoides (L.) Ker. This orchid occurs in great abundance in the beds of several drained millponds of Wicomico and Sussex Counties.

Corallorhiza odontorhiza Nutt. This fall-flowering plant occurs in pine woods about two miles south of Salisbury, Wicomico County.

Arenaria peploides L. var. robusta Fernald. This northern strand plant occurs about three miles north of Ocean City, Worcester County. The species has been recorded as far south as Cape Henry, but colonies in Delaware, Maryland, and Virginia appear to be few and far between.

Claytonia virginica L. The spring beauty is a rarity on the lower Eastern Shore. One small colony occurs in rich woods about six miles west of Berlin, Worcester County.

Aquilegia canadensis L. The columbine grows abundantly on a slope on the left bank of the Wicomico River, about one mile below Salisbury. The colony is many miles from any other known colony and is not known to be an introduction.

Sanguinaria canadensis L. The bloodroot grows in rich woods on each side of the Maryland-Virginia line near Greenbackville, Worcester County, apparently far removed from more inland centers of occurrence.

Dentaria laciniata Muhl. This species occurs sparingly in rich woods near Wattsville, Accomac County.

Sarracenia purpurea L. The pitcher plant is local in swamps of eastern Maryland and southern Delaware. *Chamaecyparis*, the southern white cedar, is often an indicator of the pitcher plant.

Chamaedaphne calyculata (L.) Moench. This northern bog shrub appears to be absent from eastern Maryland and southern Delaware. A station at Glenburnie, Anne Arundel County, has long been known. The writer recently found a much larger colony at Round Bay, in the same county. *Sarracenia* and *Chamaecyparis* also occur here.

Trientalis americana (Pers.) Pursh. A small colony of the star flower was discovered by the writer in Rock Creek Park, of the District of Columbia, a little west of the Coastal Plain. This appears to be the first record for the region.

Obolaria virginica L. This species is occasional in rich woods in the northeastern part of Accomac County.

Lobelia elongata Small. A little of this plant occurs at the edge of a marsh along the left bank of the Wicomico River at

Upper Ferry. Dr. Rogers McVaugh has informed the writer that this appears to be the first record for Wicomico County.

Erigeron pulchellus Michx. This spring-flowering composite occurs in rich woods in the southeastern corner of Worcester County, just north of the Virginia line.

Prenanthes autumnalis Walt. This pine-barren species occurs sparingly in a low clearing about six miles southeast of Salisbury, Wicomico County, apparently the first record for the plant in the region since it was collected by Commons and Canby prior to 1895.

Langlois Herbarium,
Catholic University of America.

A Little-known Collection from Missouri.—In Rhodora **42:** 98 (April, 1940), Steyermark records as a new species for Missouri, *Isotria verticillata*, collected by *Savage* and *Shull* near Poplar Bluff; specimen in the Herbarium of Field Museum. The name Shull is a notable one in American biology, so it is easy to see why it might get into a paper as a misprint of a similar name, and so it is in this case. The collection was made by *Savage, T. E.*, and *Stull, Wilfred,* who were students at the State University of Iowa in the late Nineties and who spent the summer of 1897 collecting plants around Poplar Bluff and Ironton, Missouri. Our herbarium has a set of these plants, probably the original one. *Pogonia verticillata,* collected August 3, 1897, bears the number 1362, though our lists account for only about 450 specimens.

Both of these men went into other fields of scientific work. Stull was a chemist, Ph.D., Harvard, 1903, was connected with the Mallinckrodt Company from then until his death in 1937. Savage became a geologist, Ph.D., Yale, 1909, and has been connected with the Illinois Geological Survey and University of Illinois for many years. We have other sets of plants bearing his name, mostly from the northwestern United States.

In a state as thoroughly explored as Missouri, it is interesting that this youthful collection of two men who were not primarily botanists should yield a new record after all these years.—W. A. Anderson, State University of Iowa, Iowa City, Iowa.

SOME SPERMATOPHYTES OF EASTERN NORTH AMERICA

M. L. Fernald

(*Continued from page 276*)

Rubus parviflorus Nutt.—a Confession.

Professor Bailey calls my attention to a humiliating error. On p. 275 I rejected *R. parviflorus* Nutt., stating that I had overlooked "the very simple fact that the latter is a later homonym of *R. parviflorus* L. Sp. Pl. 1197 (1753)." The actual fact, most unfortunately, is that the Linnean species was *R. parvi*folius. *R. parviflorus* Nutt. is the valid name for the North American species.

Rubus hispidus L., var. **obovalis** (Michx.), comb. nov. *R. obovalis* Michx. Fl. Bor.-Am. i. 298 (1803).

True *Rubus hispidus* L., as shown by Bailey in Gentes Herbarum, i. 174, fig. 77 (1923), is the coarse extreme of the species, with copiously setose primocanes and petioles. It is in part *R. hispidus*, var. *major* Blanchard in Rhodora, viii. 213 (1906), Blanchard taking the less bristly and more slender *R. obovalis* as his *R. hispidus*. I distinguish the two as follows:

R. hispidus L. (typical). Canes woody, the stronger portions 2–5 mm. in diameter; primocanes with 300–2000 bristles and glands on a dm. of the median and terminal growth; petioles of principal new primocane-foliage with 100–500 bristles; terminal leaflet of primocanes 2.5–7 cm. long, 2–5.5 cm. broad.

Var. obovalis. More slender; canes weaker, mostly 1–2 mm. in diameter, quite smooth or with only 1–100 bristles per dm.; petioles of primocane-foliage smooth or with 1– rarely 100 bristles; terminal leaflet 1.5–4.5 cm. long, 1–3.5 cm. broad.

The slender var. *obovalis* is wider-ranging and extends farther south than the coarser and more bristly typical *R. hispidus*. I have studied the material in the Gray Herbarium and the herbaria of the New England Botanical Club and of the National Museum of Canada. These collections give the following results.

	Typical hispidus	Transition	Var. obovalis
So. Quebec and so. Ontario	14	0	5
Prince Edward Island and New Brunswick	8	0	0
Nova Scotia	6	2	12
Maine, New Hampshire and Vermont	50	4	55
Massachusetts	13	2	72
Rhode Island and Connecticut	3	1	17

	Typical hispidus	Transition	Var. obovalis
New York	4	5	4
New Jersey	2		7
Virginia	1		5
North Carolina	0		2
Ohio	0		1
West Virginia	0		1
Indiana	0		2
Michigan	1		0

Rubus, subg. Eubatus, § **Tholiformes,** nom. nov. § *Hispidi*, ser. *Jacentes* Bailey, Gentes Herbarum, i. 248 (1925). § *Jacentes* Bailey, ibid. ii. 300, 346 (1932).

True *Rubus jacens* Blanchard in Torreya, vi. 147 (1906), is, as originally stated by Blanchard, a small member of the *Hispidi*, with slender canes trailing, and elongating to about 1 m. It is a local plant of dry clearings and pastures from the warm Connecticut Valley of southwestern New Hampshire (tobacco country) to southeastern New York and eastern Pennsylvania. The coarse arching or doming plant, so abundant in Nova Scotia and in the White Mountain region, thence extending northward into Quebec and west across northern New York, not only makes complex domes, with arching to ascending primocanes, but its long curving branches, reaching the ground, trail for 2–3 meters and then root. This coarse plant, misidentified by Brainerd and Peiterson (Blackberries of New England, Vt. Agric. Expt. Sta. Bull. 217: 77 (1920)) and later by Bailey (in including the Nova Scotian plant) is very unlike true *R. jacens*. It is the species I am calling *R. adjacens*. Since I can hardly place *R. jacens* in a section apart from the equally depressed *R. hispidus* Michx., *R. vigil* Bailey and *R. cubitans* Blanchard, and since *R. adjacens* has the coarser and doming habit of *R. permixtus* Blanchard, *R. arcuans* Fern. & St. John, *R. tardatus* Blanchard, *R. severus* Brainerd, and *R. novanglicus* Bailey (members of § *Jacentes*, as treated by Bailey) this doming and arching section can hardly be called § *Jacentes* (based on *R. jacens*). On account of the arching or doming habit of growth, the chief diagnostic character of the section, which separates it, on the one hand, from the prostrate § *Hispidi* Rydb., on the other from § *Setosi* Bailey, erect plants without long-arching and tip-rooting canes, I am renaming § *Jacentes* as defined by Bailey, l. c., and basing the

Photo. H. G. Fernald.

Rubus tholiformis: fig. 1, characteristic primocane-leaf, × 1; fig. 2, summit of petiole and bases of leaflets, × 5; fig. 3, lower surface of leaflet, × 10.

Photo. H. G. Fernald.

RUBUS THOLIFORMIS: FIG. 1, portions of floricane and inflorescences, × 1; FIG. 2, flowers and pedicels, × 5; FIG. 3, portion of primocane, × 3.

name on the characteristic doming *R. tholiformis*, which admirably displays the habit of the section.

RUBUS (EUBATUS, § THOLIFORMES) **tholiformis,** sp. nov. (TAB. 606 et 607), valde arcuans cannis tholos formantibus, cannis vel ramis ad 1 m. longis apice saepe radicantibus; primocannis 3–7 mm. diametro densissime griseo- vel fusco-glandulosis setosisque, setis divergentibus 1–2 mm. longis aculeiformibus subrigidis; primocannae foliis quinatis ternatisve chartaceis pallidis opacis glabris, costis subtus prominulis pilosis; foliolis elliptico-ovalibus plerumque basi apiceque acuminatis duplicato-serratis; foliolo terminali 7–11 cm. longo 3.5–6.5 cm. lato basi subrotundato petiolulo glandulifero setosoque 1.2–2.4 cm. longo; floricannae foliis ternatis, foliolis obovatis vel late ovatis acutis anguste serrato-dentatis; inflorescentiis corymbosis vel corymboso-racemosis rhachis pedicellis calycibusque griseo-villosis; bracteis saepe trifidis; pedicellis subadscendentibus 1–2 cm. longis glandulosis plus minusve setosis; calycis glanduloso-setosis, lobis brevibus deinde reflexis; petalis 0.5–1 cm. longis, 3–4 mm. latis; fructibus subglobosis 1–1.3 cm. diametro.—Abundant in Coös County, NEW HAMPSHIRE: sandy terraces of Connecticut River, Stewartstown, September 4, 1917, *Fernald & Pease*, no. 15,600; damp or springy thickets, Colebrook, July 18 and 19, 1917, *Fernald & Pease*, no. 15,723, September 3, 1917, *Fernald & Pease*, nos. 15,604 and 15,605; dry bushy hillside, Colebrook, September 3, 1917, *Fernald & Pease*, no. 15,661; sandy plains, thickets and roadsides, Stratford, July 18, 1917, *Fernald & Pease*, nos. 15,724, 15,728 and 15,729, September 3, 1917, *Fernald & Pease*, no. 15,666; damp alluvial thicket (by Connecticut River), Northumberland, July 18, 1917, *Fernald & Pease*, no. 15,722, September 3, 1917, *Fernald & Pease*, no. 15,784; boggy thickets and clearings, Lancaster, July 18, 1917, *Fernald & Pease*, no. 15,817; sandy roadside, Millsfield, September, 5, 1917, *Fernald & Pease*, no. 15,658; alluvial thicket by Androscoggin River, Errol, September 5, 1917, *Fernald & Pease*, no. 15,783; bushy swales and borders of woods, Randolph, July 18, 1917, *Fernald & Pease*, no. 15,733 (TYPE in Herb. Gray), August 8, 1917, *Fernald & Pease*, no. 15,666. All distributed erroneously as *R. frondisentis* Blanchard.

Rubus tholiformis, identified by the late Ezra Brainerd as *R. frondisentis* Blanchard, is really very unlike that species in many characters. *R. frondisentis*, of southeastern Vermont and adjacent southwestern New Hampshire, is a stiffly erect species, with hard prickles, and leaves velvety beneath. *R. tholiformis*, separated from it by three-fifths the length of New Hampshire

and by the White Mountain system, has doming canes with tip-rooting branches, the primocanes densely covered with fine setae, the leaves quite glabrous except for the pilose nerves beneath. Superficially *R. tholiformis* suggests *R. aculiferus* of northern New Hampshire, *R. adenocaulis* of Nova Scotia and the following species of northern New Hampshire. *R. aculiferus* and *R. adenocaulis* have the leaves velvety-pilose beneath, the flowers large, with petals mostly 1.3–1.5 cm. long and 5–10 mm. broad. The primocanes of *R. aculiferus* have hard conic-subulate prickles and very few glands, and the petioles and petiolules are strongly prickly and essentially glandless; *R. tholiformis*, with glabrous foliage with heavily glandular and finely setose petioles and petiolules, and with small petals, really has little relationship to it. *R. adenocaulis* shares with *R. tholiformis* the densely glandular and short-setose primocanes but, as noted, its foliage is velvety-pilose beneath, its terminal primocane-leaflets are subcordate and on petiolules 2–4 cm. long (in *R. tholiformis* narrowed to slightly rounded to base and on petiolules only 1.2–2.4 cm. long), its raceme elongate instead of corymbiform, with strongly armed rachis, entire upper bracts, much larger petals and larger fruits. The many characters separating *R. tholiformis* from the following species will be considered in the discussion of that plant.

Rubus tholiformis is so abundant and characteristic in sandy or alluvial thickets, on sand plains or in sandy swamps of the upper Connecticut and upper Androscoggin systems north of and among the northern White Mountains that it should confidently be sought in Essex County, Vermont, Compton County, Quebec and Oxford County, Maine.

Plate 606, fig. 1, is a characteristic leaf of a primocane, × 1, from Stratford, Coös County, New Hampshire, *Fernald & Pease*, no. 15,728; fig. 2, junction of primocane-leaflets, × 5, from Stewartstown, New Hampshire, *Fernald & Pease*, no. 15,600; fig. 3, lower surface of primocane-foliage, × 10, from no. 15,728. In plate 607, fig. 1 is a flowering branch, × 1, from Stratford, *Fernald & Pease*, no. 15,729; fig. 2, flowers and pedicels, × 5, from no. 15,729; fig. 3, piece of primocane, × 3, from no. 15,728.

Rubus (Eubatus, § Tholiformes) **spiculosus,** sp. nov. (tab. 608 et 609), valde arcuans deinde depressis, cannis vel ramibus ad 2 m. longis apicibus prostratis rarissime radicantibus; primocannis 3–6 mm. diametro retrorso-setosis, setis ad 3 mm. longis discretis (100–500 per dm.), glandulis sparsis; primocannae foliis

Photo. H. G. Fernald.

Rubus spiculosus: fig 1, characteristic primocane-leaflets, × 1; fig. 2, summit of petiole and bases of leaflets, × 5; fig. 3, portion of primocane, × 3.

Photo. H. G. Fernald.

RUBUS SPICULOSUS: FIG. 1, tip of flowering shoot, × 1; FIG. 2, calyx and pedicel, × 5.

quinatis firmis pallidis glabris petiolo 6–12 cm. longo sparse setoso vix glandulifero; foliolis elliptico- vel rhomboideo-ovatis longe acuminatis acute serratis costis subtus prominulis glabris vel glabrescentibus; foliolo terminali 7–14 cm. longo 3.5–8 cm. lato saepe subcordato petiolulo sparse setoso 1–3 cm. longo; floricannae foliis ternatis, foliolis anguste ovatis vel rhomboideo-obovatis acuminatis argute serratis; racemis laxis saepe subcorymbiformibus rhachi pilosi 3–8 cm. longi; bracteis lanceolatis saepe incisis; pedicellis laxe patentibus plerumque 2.5–5 cm. longis griseo-pilosis glanduliferis vix setosis; calycis pilosis saepe glandulosis lobis 6–7 mm. longis deinde reflexis; petalis anguste obovatis 1.2–1.5 cm. longis, 5–9 mm. latis; fructibus subglobosis 1.3 cm. diametro.—Northern and central NEW HAMPSHIRE: Coös County: wooded bank of Magalloway River, Errol, September 5, 1917, *Fernald & Pease*, no. 15,678; borders of dry woods near Mascot Pond, Gorham, *Fernald & Pease*, no. 15,659; borders of woods by the carriage road, Mount Washington, at 760 m., August 7, 1917, *Fernald & Pease*, no. 15,774. Grafton County: dry thickets and borders of woods, Lincoln, July 28, 1917, *Fernald*, nos. 15,707, 15,708, 15,795, 15,801, 15,802, 15,815 and 15,816, September 23, 1917, *Fernald*, no. 15,602; sandy roadsides and clearings, Johnson, Lincoln, August 25, 1917, *Fernald*, no. 15,676; borders of dry or wet woods or in alluvial thickets, North Woodstock, Woodstock, July 11, 1915, *Fernald*, no. 11,761; August 7, 1915, *Fernald*, no. 11,745, July 14, 1917, *Fernald*, no. 15,790 (also in Pl. Exsicc. Gray., no. 361), July 31, 1917, *Fernald*, no. 15,718; August 3, 1917, *Fernald*, no. 15,598, August 20, 1917, *Fernald*, no. 15,664, September 12, 1917, *Fernald*, no. 15,791, mature of no. 15,790 (also in Pl. Exsicc. Gray., nos. 362 and 363, primocane and fruit of no. 361); damp thickets, clearings and roadsides, Thornton Gore, Thornton, July 28, 1917, *Fernald*, no. 15,814, August 27, 1917, *Fernald*, no. 15,766 (TYPE in Herb. Gray); dry thickets, clearings, swampy woods and roadsides, Plymouth, August 1, 1917, *Fernald*, nos. 15,595, 15,809 and 15,828. Belknap County: moist sandy thickets and borders of woods, Laconia, August 30, 1917, *Fernald*, no. 15,689; swampy thickets and damp borders of sandy woods, Gilford, no. 15,653. Specimens erroneously distributed as *R. multiformis* Blanchard or as "*R. canadensis* × *setosus*, fide Brainerd."

Just as *Rubus tholiformis* is the abundant pale-leaved and short-bristly doming or arching and finally tip-trailing species in the alluvial thickets and on terraces and sandy roadsides and sand plains of northernmost New Hampshire, so *R. spiculosus* is the superabundant species of similar habit in north-central New Hampshire, overlapping *R. tholiformis* only in eastern Coös

County, but dominating the sandy thickets of the Pemigewasset Valley. *R. tholiformis* has the grayish primocanes densely glandular and with almost innumerable horizontally divergent fine bristles only 1–2 mm. long; *R. spiculosus* has the primocanes greener and glabrous, with few or negligible glands and with scattered reflexed bristles mostly 3 mm. long. In *R. tholiformis* the foliage is chartaceous, with the prominent costae of the lower side strongly pilose; in *R. spiculosus* firmer, with the glabrous or glabrescent costae not specially prominent. In *R. tholiformis* the petioles and petiolules are heavily glandular, in *R. spiculosus* not. In *R. tholiformis* the subascending pedicels are 1–2 cm. long and more or less setose; in *R. spiculosus* the loosely divergent pedicels are mostly 2.5–5 cm. long and scarcely if ever setose. The petals of *R. tholiformis* are narrow, 3–4 mm. wide, and only 5–10 mm. long; in *R. spiculosus* they are showy, 5–9 mm. broad and 1.2–1.5 cm. long. In the silts and gravels of the Upper Connecticut where *R. tholiformis* abounds, lime is relatively abundant; in those of the Pemigewasset it is relatively deficient. These two superficially similar but really very distinct species well illustrate the localization of many species in the genus, many scores or hundreds of them yet to be worked out.

The identification of *Rubus spiculosus* with *R. multiformis* was unfortunate, for the latter species, although with a too catholic specific name, is quite glandless and its racemes are very prolonged. Brainerd's disposition of the many numbers of *R. spiculosus* as "*R. canadensis* × *setosus*" was an easy and ill considered verdict. The most accurate accounts of *R. canadensis* and *R. setosus* (in Bailey, Gent. Herb. ii. fasc. vi) correctly characterize the former as a "Tall upright smooth more or less glossy plant . . . Primocanes erect or upright-arching"; and *R. setosus* as an "erect or strongly ascending blackberry of low stature, . . . not tip-rooting." How, by crossing two species with erect habit constant offspring with long-arching and tip-rooting primocanes could be produced Brainerd did not attempt to explain; he was satisfied to assert that such was the source of *R. spiculosus*. Unfortunately, tentatively accepting his verdict, I long ago distributed all the duplicate material under the patently impossible identification supplied by him. In view of the extensive ranges of both *R. canadensis* (Newfoundland to

Photo. H. G. Fernald.

RUBUS ACULIFERUS: FIG. 1, characteristic primocane-leaflets, × 1; FIG. 2, lower surface of leaflet, × 10.

Photo. H. G. Fernald.

Rubus aculiferus: fig. 1, portion of raceme, × 1; fig. 2, calyx and pedicel, × 5; fig. 3, portion of primocane, × 3.

Ontario, south to New England and New York and along the mountains to Georgia) and *R. setosus* (Newfoundland and Quebec to Wisconsin, south to Nova Scotia, New England and Pennsylvania) it would be most singular if they were, to use Bailey's phrase, "to spawn into mongrels" (and mongrels so unlike either parent), that this phenomenon should transpire only in north-central New Hampshire and that there the "mongrel" should be so constant and ubiquitous a species.

In PLATE 608, FIG. 1 is a portion of a typical leaf of a primocane, × 1, from Thornton, Grafton County, New Hampshire, *Fernald,* no. 15,814; FIG. 2, junction of primocane-leaflets, × 5, from 15,814; FIG. 3, portion of primocane, × 3, from no. 15,814. In PLATE 609, FIG. 1 is an inflorescence, × 1, from Woodstock, New Hampshire, *Fernald,* no. 11,761; FIG. 2 a flower-bud and pedicel, × 5, from no. 11,761.

RUBUS (EUBATUS, § THOLIFORMES) **aculiferus,** sp. nov. (TAB. 610 et 611), arcuans deinde depressus valde ramosus, cannis vel ramis ad 3 m. longis apice saepe radicantibus; primocannis 5–10 mm. diametro aculeatis glanduliferisque, aculeis conico-subulatis rectis numerosissimis; primocannae foliis quinatis submembranaceis subtus pilosis petiolo longo aculeato glanduliferoque, foliolis ovatis longe acuminatis anguste duplicato-serratis, foliolo terminali cordato 8–12 cm. longo 5–8 cm. lato petiolulo setoso 1.5–3.5 cm. longo; floricannae foliis ternatis, foliolis ovalibus vel obovatis grosse serratis; inflorescentiis corymbosis corymboso-racemosis vel cymosis rhachi pedicellis calycibusque villoso-tomentosis, rhachi sparse setoso nec aculeato; bracteis superioribus plerumque divisis; pedicellis plerumque 2–8 cm. longis divergentibus; calycibus villosis lobis 7 mm. longis; petalis elliptico-obovatis 1.5 cm. longis 6–10 mm. latis; fructibus subglobosis 1 cm. diametro.—Abundant in northern NEW HAMPSHIRE: Coös County: sandy roadsides and thickets, Stratford, July 18, 1917, *Fernald & Pease,* no. 15,715; damp alluvial thicket, Northumberland, July 18, 1917, *Fernald & Pease,* no. 15,716; dry fields, clearings and thickets, Shelburne, September 6, 1917, *Fernald & Pease,* no. 15,765. Grafton County: abundant in woods and thickets along Eastman Brook, Thornton Gore, Thornton, July 28, 1917, *Fernald,* no. 15,710 (TYPE in Herb. Gray), August 27, 1917, *Fernald,* no. 15,810 (fruit of no. 15,710); damp thicket, borders of woods and roadsides, 1/2 mile west of Russell Pond trail, Thornton Gore, Thornton, August 27, 1917, *Fernald,* no. 15,606; borders of dry woods and recent clearings, North Woodstock, Woodstock, July 8, 1917, *Fernald,* no. 15,786, also *Fernald* in Pl. Exsicc. Gray., no. 364, August 15, 1917, *Fernald,* no. 15,837 (fruit of no. 15,786), also *Fernald* in Pl. Exsicc. Gray., no. 366 (fruit of no. 364), August 20, 1917, *Fernald,* no. 15,617. All distributed incorrectly as *R. abbrevians* Blanchard.

Rubus aculiferus, like *R. adenocaulis,* has most singularly been called *R. abbrevians.* The latter, as explained in the discussion of *R. adenocaulis,* is a very low and stiffly erect plant, with no inclination to tip-rooting. *R. aculiferus,* however, is one of the most extreme of tip-rooting species. The young and simple primocanes are at first ascending and up to nearly 2 m. in height. They then branch and rebranch, quickly making an intricate dome of fiercely prickly stems. These arching canes and branches soon reach the ground and extensively trail, often reaching a length of 2 or 3 m. From the abundant *R. adenocaulis* of Nova Scotia, the equally abundant *R. aculiferus* of the White Mountain country differs in the very sparse glandularity of its primocanes, in the essentially glandless petiolules of the primocane-leaflets, in its more corymbose or loosely cymose inflorescence with merely setose rachis and with the upper bracts mostly deeply cleft, and in the very long and loosely spreading pedicels. Its fruit is of superior quality. Extending generally north to the international boundary, *R. aculiferus* is confidently to be sought in the Eastern Townships of Quebec and also in northeastern Vermont.

In PLATE 610, FIG. 1 is a portion of a typical primocane-leaf, × 1, from Woodstock, New Hampshire, *Fernald,* no. 15,837; FIG. 2, lower surface of leaf, × 10, from no. 15,837. In PLATE 611, FIG. 1 is a raceme, × 1, from Northumberland, New Hampshire, *Fernald & Pease,* no. 15,716; FIG. 2, a flower-bud and pedicel, × 5, from Woodstock, *Fernald,* no. 15,786; FIG. 3, portion of cane, × 3, from no. 15,837.

RUBUS (EUBATUS, § THOLIFORMES) **adenocaulis,** sp. nov. (TAB. 612–615), arcuans vel deinde procumbens valde ramosus, cannis vel ramis 1–2 m. longis saepe radicantibus; primocannis 5–8 mm. diametro densissime glanduliferis plus minusve aculeatis, aculeis rectis basi latis, glandulis saepe fasciculatis numerosissimis; primocannae foliis quinatis firmis subtus pilosis petiolo 4–12 cm. longo aculeato glanduliferoque, foliolis ovalibus vel ovatis vel ovali-obovatis acuminatis anguste duplicato-serratis, foliolo terminali cordato vel subcordato 5–9 cm. longo 3.5–8.5 cm. lato petiolulo glandulifero aculeatoque plerumque 2–4 cm. longo; floricannae foliis ternatis, foliolis anguste ovalibus acuminatis; racemis elongatis rhachi pedicellis calycibusque dense villoso-tomentosis, rachi valde armato; bracteis superioribus integris vel subintegris; pedicellis subadscendentibus 1–2 (–3) cm. longis; calycis lobis villosis 4–6 mm. longis; petalis elliptico-obovatis 1–1.4 cm. longis 5–10 mm. latis; fructibus globoso-ovoideis 1.5–2 cm. longis.—Southwestern NOVA SCOTIA: Yarmouth

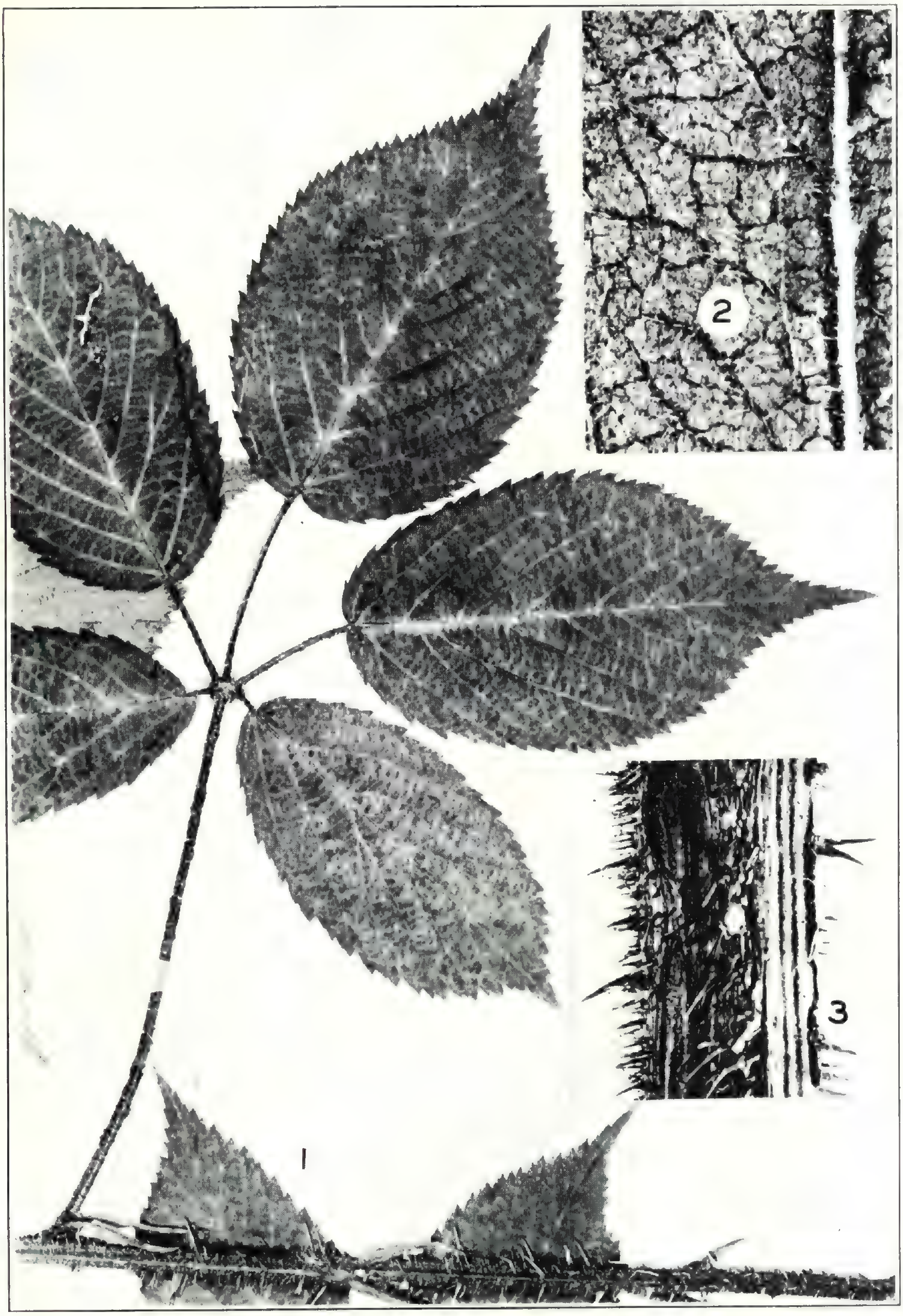

Photo. H. G. Fernald.

Rubus adenocaulis: fig. 1, portion of primocane and typical leaf, × 1; fig. 2, lower surface of leaflet, × 10; fig. 3, portion of primocane, × 3.

Photo. H. G. Fernald.

RUBUS ADENOCAULIS: FIG. 1, medium-sized inflorescence, × 1; FIG. 2, flower-buds and pedicels, × 5.

Co.: damp to dryish roadside thickets, Yarmouth, July 24, 1920, *Fernald, Bean & White*, no. 21,545; September 7, 1920, *Fernald, Long & Linder*, no. 21,557 (fruit of no. 21,545); rocky roadsides and borders of woods, Yarmouth, July 4, 1920, *Pease & Long*, no. 21,585 (TYPE in Herb. Gray); gravelly railroad bank, Tusket, July 21, 1921, *Fernald, Bartram, Long & Fassett*, no. 23,996; open rocky thicket near Vaughan (Tusket) Lake, Gavelton, August 13, 1921, *Fernald & Long*, no. 24,016; sphagnous thicket, Markland (Cape Forchu), July 13, 1921, *Fernald, Bartram, Long & Fassett*, no. 23,982; border of spruce swamp, Markland (Cape Forchu), August 22, 1921, *Fernald & Long*, no. 24,025 (fruit of no. 23,982); Glenwood, September 13, 1924, *J. G. Jack*, no. 3416. Shelburne County: rocky railroad bank, Wood Harbor, July 9, 1920, *Fernald, Bissell & Linder*, no. 21,616; gravelly railroad bank, Atwood Brook, July 14, 1921, *Bartram & Long*, no. 23,987; rocky thicket bordering Welchtown (Birchtown) Lake, August 2, 1921, *Fernald & Long*, no. 24,003; sandy railroad ballast, Shelburne, August 3, 1921, *Fernald & Long*, no. 24,008 (as *R. arcuans* Fern.); sandy railroad bank, Sable River, August 4, 1921, *Fernald & Long*, no. 24,011 (as *R. arcuans*). Most specimens erroneously distributed as *R. abbrevians* Blanchard.

Rubus adenocaulis is very different from *R. abbrevians;* only a desperate wish to place it somewhere accounts for its original identification (coupled with the fact that it superficially resembles the characteristic doming, arching and tip-rooting shrub of the White Mountains which Brainerd had erroneously referred to *R. abbrevians*). *R. abbrevians,* however, as its name signified, is a stiffly erect shrub only 3–6 dm. high, the canes slenderly bristly. It is the type of the very definite section *Abbreviantes* Bailey. In its doming and finally long-trailing canes *R. adenocaulis* belongs in the § *Tholiformes.* Its only close ally is the common White Mountain species which has also erroneously passed as *R. abbrevians.* In its more prostrate extreme *R. adenocaulis* might be mistaken for *R. biformispinus* Blanchard, a wide-ranging species, from Quebec to New York, south to Nova Scotia, southern New England and eastern Pennsylvania, but that species has the leaves glabrous on the lower face, leaflets of the floricanes blunt or merely acutish, the rachis of the raceme unarmed, the petals only 4–6 mm. broad.[1] The misidentification

[1] In view of the prolonged canes and the collection of the type by *Long & Pease,* it has been suggested that an appropriate specific name could be made by uniting their names by the conventional connective, *i.* The necessary distortion of spelling and the question of capital initials leads me to forego this intriguing possibility.

with *R. arcuans* was quite inexcusable, for that species has glabrous foliage with obovate primocane-leaflets, the terminal one abruptly short-tipped and with only 12–35 coarse teeth on each side; the ovate long-acuminate terminal leaflet of *R. adenocaulis* being soft-pubescent beneath and with 40–50 fine serrations on each margin.

In plate 612, fig. 1 is a portion of primocane and a leaf, × 1, from the type, Yarmouth, Nova Scotia, *Pease & Long,* no. 21,585; fig. 2, lower leaf-surface, × 10, from type; fig. 3, portion of cane, × 3, from Shelburne, Nova Scotia, *Fernald & Long,* no. 24,008. In plate 613, fig. 1 is a medium-sized inflorescence, × 1, from the type; fig. 2, flower-buds and pedicels, × 5, from the type. Plate 614 is a larger inflorescence, × 1, borne on sprout-growth, from Sable River, Nova Scotia, *Fernald & Long,* no. 24,011. Plate 615 is a fruiting branch, × 1, from Gavelton, Nova Scotia, *Fernald & Long,* no. 24,016.

Rubus (Eubatus, § Tholiformes) **adjacens,** sp. nov. (tab. 616–618) arcuans vel deinde procumbens, cannis ad 2.5 m. longis, 3–8 mm. crassis; primocannis tholos formantibus apice liberis vel radicantibus densissime retroso-setosis plus minusve glandulosis, setis purpurascentibus vel coloratis valde imbricatis (3000–5000 per dm.); primocannae foliis coriaceis atroviridibus lucidis glabris quinatis vel ternatis petiolo 6–12 cm. longo setoso glanduliferoque, foliolis obovatis vel rhomboideis abrupte breviterque acuminatis serrato-dentatis, foliolo terminali rhomboideo-obovatis basi rotundo-subcuneato 4–8 cm. longo 2.5–5 cm. lato petiolulo piloso setifero glanduloque 0.5–1.8 cm. longo; floricannae foliis ternatis; foliolis anguste cuneato-obovatis subcoriaceis acutis vel subacutis, acute serratis; inflorescentiis corymbiformis corymbiformi-racemosis vel cymosis rhachi pedicellis calycibusque pilosis plus minusve armatis glanduliferisque; bracteis mediis lanceolatis simplicibus vel incisis; pedicellis arcuato-adscendentibus plerumque 1.5–2.5 cm. longis; calycis lobis plus minusve glanduloso-setosis 2.7–5 (–6) mm. longis; petalis anguste oblanceolatis 7–12 mm. longis 2–5 mm. latis; fructibus subglobosis ca. 1 cm. diametro.—Quebec to Nova Scotia, Maine and Massachusetts. Quebec: woods, vicinity of St. Jerome, Laurentide Mountains, July 8, 1920, *Victorin,* no 11,233. New Brunswick: low land, Shediac Cape, July 27, 1914, *F. T. Hubbard;* railroad embankment, Ingleside, Westfield, Kings County, August 8, 1909, *Fernald & Wiegand.* Nova Scotia: Lunenburg County: rocky thickets and woods, bordering Big Mushamush Lake, August 17, 1921, *Fernald & Long,* no. 24,024. Digby County: boggy thickets, Sandy Cove, August 28, 1921, *Fernald & Long,* no. 24,030; sandy roadsides, Weymouth, August 8, 1921, *Fernald & Long,* no. 24,012; moist thickets, Meteghan, July 7, 1920, *Fernald & Long,* no. 21,551. Shelburne County: gravelly railroad bank, Atwood

Photo. H. G. Fernald.

Rubus adenocaulis: tip of vigorous flowering sprout, × 1.

Photo. H. G. Fernald.

RUBUS ADENOCAULIS: fruiting racemes, × 1.

Brook, July 14, 1921, *Bartram & Long*, no. 23,988; dry rocky and gravelly slopes, Shag Harbor, July 9, 1920, *Fernald, Bissell & Linder*, no. 21,630. Yarmouth County: dry gravelly railroad embankment, Arcadia, July 12, 1920, *Pease & Long*, no. 21,542; damp to dryish roadside thickets, Yarmouth, July 24, 1920, *Fernald, Bean & White*, no. 21,546; gravelly railroad embankment, Yarmouth, September 7, 1920, *Fernald, Long & Linder*, no. 21,558; rocky and gravelly woods and thickets bordering Cedar Lake, July 11, 1920, *Fernald, Bissell, Pease, Long & Linder*, no. 21,599; gravelly thicket, Lower Argyle, August 11, 1920, *Fernald, Bissell, Graves, Long & Linder*, no. 21,619; sphagnous thicket, Markland (Cape Forchu), July 13, 1921, *Fernald, Bartram, Long & Fassett*, no. 23,983; rocky and cobbly border of Lake George, July 16, 1921, *Fernald & Fassett*, no. 23,992. MAINE: dry soil, Pembroke, July 24, 1909, *Fernald & Wiegand;* border of moist woods and thickets, Lyman, August 10, 1916, *Fernald & Long*, no. 13,902; west road to West Kennebunk, Kennebunk, July 12, 1905, *Blanchard* (as *R. hispidus*, var. *major*). NEW HAMPSHIRE: Coös County: boggy thickets and woods near Gorham, August 9, 1917, *Fernald & Pease*, no. 15,805. Grafton County: thickets, clearings and borders of woods, Lincoln, August 13, 1917, *Fernald*, no. 15,601, July 28, 1917, *Fernald*, nos. 15,706 and 15,719, August 23, 1917, *Fernald*, no. 15,838; dry or moist thickets or clearings, North Woodstock, Woodstock, August 7, 1915, *Fernald*, nos. 11,762, 11,764 and 11,767, July 6, 1915, *Fernald*, no. 11,779, August 20, 1917, *Fernald*, no. 15,614 (TYPE in Herb. Gray), July 14, 1917, *Fernald*, no. 15,750 (also in Pl. Exsicc. Gray., no. 367), August 22, 1917, *Fernald*, no. 15,751, fruit of no. 15,752 (also in Pl. Exsicc. Gray., nos. 368 and 369, primocane and fruit of no. 367), August 20, 1917, *Fernald*, no. 15,811; damp thickets and borders of woods, Thornton Gore, Thornton, August 27, 1917, *Fernald*, no. 15,609, 15,772 and 15,773. Belknap County: swampy thicket and damp border of sandy woods, Gilford, August 30, 1917, *Fernald*, no. 15,775. VERMONT: Ripton, August 19–21, 1903, *Eggleston*, no. 3241, as *R. hispidus* × *setosus*. MASSACHUSETTS: gravelly railroad bank, Concord, October 24, 1897, *W. P. Rich*. Mostly distributed erroneously as *R. jacens* Blanchard.

Rubus adjacens has passed generally as *R. jacens* Blanchard; some specimens have been identified as *R. hispidus* Michx. (var. *major* Blanchard). True *R. jacens*, however, is a relatively slender trailer with thin and pale green chartaceous primocane-foliage with lateral ribs impressed above and prominent beneath, the leaflets oblong-ovate and long-acuminate, and calyx mostly

without glands. It occurs in relatively warm areas, the type-region, Alstead, New Hampshire, along the Connecticut River, being an area with many southern trees and shrubs (*Carya spp.*, *Castanea dentata*, *Quercus ilicifolia* and *prinoides*, *Sassafras albidum*, *Xanthoxylum americanum*, *Acer nigrum*, *Ceanothus americanus*, *Rhododendron roseum* and *Lonicera dioica*). It is clearly of the § *Hispidi*. *R. adjacens* is a relatively coarse species, the heavy primocanes doming, but finally becoming depressed. The material from northern New Hampshire was cited by Brainerd & Peiterson under *R. jacens* (as *R. hispidus* × *setosus*) and the error has been continued by others. It is one of the northernmost species, having its great development in western Nova Scotia, in the area of spruce forest, and in the White Mountain region, quite outside the limits of *Carya* and *Sassafras*. *R. adjacens* has coriaceous and lustrous primocane-foliage somewhat suggesting that of typical *R. hispidus* Michaux, but that has more truly evergreen leaves, with round-tipped or obtuse blunt-toothed leaflets, the floricane-leaflets firmer and obtuse, the pedicels only minutely (instead of strongly) pilose, the calyx mostly glandless, and the soon completely trailing primocanes bear only 200–2000 (in var. *obovalis* only 0–200) bristles and glands per decimeter (against 3000–5000 in the thinner-leaved, more arching *R. adjacens*, which has acute leaflets with sharp teeth, the calyx strongly glandular). In the very copious and overlapping bristles *R. adjacens* suggests *R. permixtus* Blanchard, but the indument of the primocane in *R. permixtus* is soft and plush-like (not stiffish), the leaflets pale and velvety to the touch beneath (not dark green, coriaceous and glabrous). *R. adjacens* likewise suggests some forms of *R. trifrons*, but its much coarser and more doming canes with 3000–5000 coarse and overlapping bristles (against a more slender habit and fewer—100–500—setae) per dm., its more coriaceous foliage and its later flowering and fruiting in the same areas, set it apart. It is as late as *R. tardatus* Blanchard but that poorly understood species has the slender canes with strong prickles and few if any setae and the primocane-foliage paler and more membranaceous, with longer-tapering strong-ribbed leaflets.

Photo. H. G. Fernald.

Rubus adjacens: fig. 1, portion of primocane, with characteristic foliage, × 1; fig. 2, summit of petiole and bases of leaflets, × 5; fig. 3, portion of primocane, × 3.

Photo. H. G. Fernald.

RUBUS ADJACENS: FIG. 1, flowering branches, × 1; FIG. 2, calyx and pedicels, × 5.

In PLATE 616, FIG. 1 is a portion of primocane with foliage, × 1, from the TYPE, Woodstock, New Hampshire, *Fernald,* no. 15,614; FIG. 2, junction of primocane-leaflets, × 5, from Woodstock, *Fernald,* no. 11,767; FIG. 3, portion of cane, × 3, from no. 11,767. In PLATE 617, FIG. 1 is a flowering branch, × 1, from Woodstock, *Fernald* in Pl. Exsicc. Gray., no. 367; FIG. 2, a calyx and pedicels, × 5, from no. 367. PLATE 618 shows fruiting racemes, × 1, from Thornton, New Hampshire, *Fernald,* no. 15,772.

RUBUS (EUBATUS, § THOLIFORMES) **bracteoliferus,** sp. nov. (TAB. 619 et 620), valde arcuans cannis tholos altos formantibus; primocannis valde elongatis 6–10 mm. diametro, apice radicantibus dense armatis, aculeis conico-subulatis setis glandulisque numerosissimis; primocannae foliis quinatis subtus subvelutinis, petiolo 1–1.3 dm. longo aculeato glanduliferoque, foliolis ovatis longe acuminatis duplicato-serratis, foliolo terminali cordato 1.2 dm. longo 7–8 cm. lato petiolulo glandulifero aculeatoque 3.5–4.3 cm. longo; floricanne foliis ternatis vel subquinatis, foliolis late ovatis acuminatis; racemis laxis rhachi 4–11 cm. longo sparse piloso plus minusve armato glanduliferoque; bracteis imis foliaceis ovatis acuminatis, superioribus valde reductis lanceolatis; pedicellis 7–12 arcuato-adscendentibus 2–4 cm. longis, glanduliferis aculeatisque, imis 3–6 bracteolas imbricatas gerentibus; calycis dorso breviter pilosis vel glabrescentibus glanduloso-setosis, lobis 7–10 mm. longis; fructibus subglobosis 1.5 cm. diametro.—NEW YORK: abundant in damp thicket back of dry sand dunes (overlying Silurian limestone) by Lake Ontario, northwest corner of Sandy Creek Township, Oswego County, August 25, 1922, *Fernald, Wiegand & Eames,* no. 14,337, distributed as *R. glandicaulis* Blanchard (TYPE in Herb. Gray).

Rubus bracteoliferus apparently belongs in the group of northern species constituting § *Tholiformes.* Its doming canes and tip-rooting habit place it there. In foliage it is very close to *R. Boyntoni* Ashe of the southern Appalachians, but its very copious armature of prickles, bristles and glands (many hundreds to a decimeter of typical primocane) and the elongate and more open racemes with much larger and acuminate lower bracts quickly distinguish it. It is really not very close to *R. glandicaulis,* that species having the upright canes of § *Alleghenienses.*

In PLATE 619, FIG. 1 is a portion of primocane, with leaf, × 1/2; FIG. 2, portion of primocane, × 3. PLATE 620 shows two fruiting racemes, × 1. All from the TYPE, from Stony Creek Township, Oswego County, New York, *Fernald, Wiegand & Eames,* no. 14,337.

RUBUS (EUBATUS, § THOLIFORMES) **paludivagus,** sp. nov. (TAB. 621 et 622), arcuans valde ramosus, cannis tholos formantibus, cannis ramisque apicibus saepe radicantibus; primocannis simplicibus deinde intricate ramosis 3–6 mm. diametro juvenilibus

puberulis deinde glabratis armatis; aculeis rectis subulatis 5 mm. longis basi 2–3 mm. latis; primocannae foliis quinatis firmis vel submembranaceis supra strigoso-pilosis, subtus subvelutinis griseis; foliolis oblongis vel anguste lanceolato-ovatis duplicato serratis acuminatis basi angustis vel subrotundatis, foliolo terminali 7–8 cm. longis 2.5–3.7 cm. latis petiolulo armato 1–1.7 cm. longo; floricannae foliis ternatis membranaceis foliolis elliptico-lanceolatis, -oblanceolatis vel anguste ovatis acuminatis; racemis laxis rhachi plerumque 4–11 cm. longo sparse piloso; bracteis plerumque trifidis 4–8 mm. longis; pedicellis laxe adscendentibus pilosis plus minusve aculeatis plerumque 1.5–3 (–5) cm. longis ebracteolatis; calycis pilosis inarmatis lobis 3–5 mm. longis vix reflexis; petalis elliptico-obovatis 1–1.5 cm. longis, 6–7 mm. latis; fructibus pergratis 1.5 cm. diametro.—Barnstable County, Massachusetts: damp thickets bordering cranberry bogs, Harwich, June 26, 1918, *Fernald*, nos. 16,909 and 16,923; moist thicket along Doane Creek, Harwichport, Harwich, August 13, 1918, *Fernald & Long*, no. 16,910; damp thickets on dikes by cranberry bogs, east of Slough Road, Harwich, August 18, 1918, *Fernald & Long*, no. 16,924 (type in Herb. Gray.); all erroneously distributed as *R. argutus* Link.

Rubus paludivagus, characteristic of the wet margins of cranberry bogs on Cape Cod, really has little to do with *R. argutus*, although its leaves are quite similar to those of *R. argutus* as shown by Bailey, Gent. Herb. i. fasc. iv. fig. 84, p. 187 (1923). Bailey there and in Gent. Herb. ii. fasc. iv. 388, figs. 168 and 169 (1932)[1] identifies *R. argutus* as a southern erect or high-climbing species, with which I am very familiar in eastern Virginia. Its short corymbiform raceme is very leafy, the rachis, short pedicels and large calyx densely villous, the calyx-lobes promptly reflexed. It belongs in § *Arguti*, whereas *R. paludivagus* is a low-arching and tip-rooting species.

In plate 621, fig. 1 is a portion of primocane, with leaf, × 1, from the type, Harwich, Massachusetts, *Fernald & Long*, no. 16,924; fig. 2, lower leaf-surface, × 10, from the type; fig. 3, fruiting raceme, × 1, from the type. In plate 622, fig. 1 is a flowering raceme, × 1, from Harwich, *Fernald*, no. 16,909; fig. 2, portion of flowering cane, × 1, from Harwich, *Fernald*, no. 16,923; fig. 3, calyx and pedicel, × 5, from no. 16,923.

[1] I have elsewhere commented on the advantages of receiving credit for absent-treatment performances.—See Science, lxxxix. 329 (1939). Bailey, op. cit. 391, states that, "In 1897 I photographed these sheets in Berlin, and pictures have been taken by Fernald (see figs. 84, 127, Gent. Herb. i)". Unfortunately, to the best of my recollection, I have never visited Berlin nor have I examined Link's type. A tracing of it, made by Dr. J. M. Greenman, December 19, 1899, is in the Gray Herbarium. It is presumably this which Bailey had in mind.

Photo. H. G. Fernald.

RUBUS ADJACENS: fruiting racemes. × 1.

Photo. H. G. Fernald.

Rubus bracteoliferus: fig. 1, portion of primocane and a primocane-leaf. × ½; fig. 2, portion of primocane. × 3.

RUBUS **laevior** (Bailey), stat. nov. *R. permixtus*, var. *laevior* Bailey, Gentes Herbarium, ii. 348 (1932).

Rubus laevior, occurring at the base of Cape Cod, differs in so many characters from *R. permixtus* Blanchard, found from southwestern Maine across New Hampshire and Vermont to central New York and originally described from the Connecticut Valley, that I find them quite as different as the other local species of the genus. The contrasts follow:

R. PERMIXTUS. Primocanes with 1000–5000 soft purple hairs and gland-tipped bristles with few prickles intermixed on a dm. of young growth; leaflets of primocane-foliage rhombic-ovate to obovate, abruptly short-pointed, the terminal ones 2.5–6.5 cm. long, and on heavily glandular petiolules only 0.7–2 cm. long; inflorescence an elongate raceme, the rachis, pedicels and calices villous-tomentose; bladeless bracts mostly lobed or cleft, lanceolate, elliptic or oval.

R. LAEVIOR. Primocanes with fewer and paler prickles and glands; leaflets of primocanes more gradually acuminate, the terminal ones 6–9 cm. long and on glandless or very sparsely glandular petiolules 2.3–3.5 cm. long; inflorescence a short corymbiform raceme or open cyme, the rachis, pedicels and calices minutely pilose to glabrescent; bladeless bracts linear-lanceolate, entire.

CENTELLA **erecta** (L. f.), comb. nov. *Hydrocotyle erecta* L. f. Suppl. 177 (1781). *H. reniformis* Walt. Fl. Carol. 113 (1788). *H. ficarioides* Michx. Fl. Bor.-Am. i. 161 (1803), not Lam. (1789). *H. repanda* Pers. Syn. i. 202 (1805). *Glyceria repanda* (Pers.) Nutt. Gen. i. 177 (1818). *Chondrocarpus repandus* (Pers.) by implication only, though ascribed by later authors as a binomial to Nutt. Gen. ii. Errata (1818). *Chondrocarpus erectus* (L. f.) Nutt. ex Wats. Bibl. Index, 425 (1878), as error for Nuttall's merely implied *C. repandus*. *H. asiatica* sensu Coult. & Rose, Revis. N. Am. Umb. 136 (1888), not L. (1753). *H. asiatica*, var. *Floridana* Coult. & Rose, l. c. (1888). *Centella asiatica* sensu Coult. & Rose in Contrib. U. S. Nat. Herb. vii. 30 (1900), not (L.) Urban (1879). *Cent. asiatica floridana* (Coult. & Rose) Coult. & Rose, l. c. (1900). *Cent. repanda* (Pers.) Small, Fl. Se. U. S. 859, 1336 (1903). *Cent. repanda floridana* (Coult. & Rose) Small, Fl. Se. U. S. l. c. (1903). *C. floridana* (Coult. & Rose) Nannfeldt in Svensk Bot. Tidskrift, xviii. 411 (1924).

Centella erecta, recently generally known as *C. repanda,* was clearly described by Linnaeus filius from Jamaica. It is the only member of the genus known from that and adjacent West Indian Islands, Fawcett & Rendle citing only the one species, as *Hydrocotyle asiatica.* The younger Linnaeus had dwarf plants

"foliis cordatis crenatis, scapis paucifloris longitudine petiolorum", but plenty of West Indian specimens also show prolonged petioles, Jamaican material, coll. by *March* in 1858, showing them 2 dm. long and many times overtopping the scapes. Walter's *Hydrocotyle reniformis* (1788) was beautifully described, with the generic and specific characters emphasized: "foliis reniformibus, dentatis, erectis. Scapis, 2, 3^{ve} 1, 2, 3^{ve} floris, involucro diphyllo", and by Watson's Bibliographic Index and by Index Kewensis it is clearly made synonymous with the later *H. repanda* Pers. (1805). Walter's trivial name was quite available, though seven years later than that of Linnaeus filius, when the Persoon name was perpetuated and finally placed under *Centella*.

The plant varies greatly in stature in response to the simplest of edaphic factors. When it grows on open mud, without shade, its creeping stems hug the ground and the clusters of leaves will be crowded, with petioles down to 2.5–0.5 cm. long, with blades, naturally, reduced in area (down to 2.5–1.5 cm. long) and increased in thickness. When it grows among tall vegetation the loosely ascending petioles extend up to 1–3 dm. in length and the blades increase in size (up to 4–8 cm. long) and become relatively thin (as in most herbs under parallel conditions). Upon this difference and an implied difference in the size of fruit Coulter & Rose attempted to differentiate *C. "asiatica,"* including *Hydrocotyle repanda* Pers., with petioles "7.5–10 cm. or even 30 cm. long" and growing from "Maryland to Florida and west to Texas"; and *C. asiatica*, var. *floridana*, "Petioles 2.5 cm. long or less, making the leaves appear in rather close clusters along the rootstock, more or less pubescent; fruit somewhat larger and more or less pubscent," this short-petioled series occurring in "Florida; also in the West Indies and Central America"; the TYPE being *A. H. Curtiss*, no. 988, from near Jacksonville, Florida (in herb. Coulter). Fortunately or unfortunately, the sheet of *Curtiss*, no. 988 which came to the Gray Herbarium contains both developments of the plant; a tuft with petioles up to 2 dm. high and blades up to 5.5 cm. long, and a repent strand with short petioles and small blades. Similarly in the West Indies both extremes and all kinds of transitions

Photo. H. G. Fernald.

RUBUS BRACTEOLIFERUS; FIGS. 1 and 2, fruiting racemes, × 1.

Photo. H. G. Fernald.

Rubus paludivagus: fig. 1, portion of primocane and characteristic primocane-leaf, × 1; fig. 2, lower surface of leaflet, × 10; fig. 8, fruiting raceme, × 1.

occur, a Jamaican sheet showing, as already noted, petioles 2 dm. long. In our experiences in Virginia the largest and smallest extremes prove to be mere responses to light and moisture. Small, who was not averse to habit-species, went no farther than Coulter & Rose, but Nannfeldt, finding what seemed to him differences in size and proportions of fruits, treated these plants as two species, *C. repanda* and *C. floridana.* Unfortunately he rather reversed the ranges given by Coulter & Rose, citing *C. repanda* only from the West Indies to Texas, and north to South Carolina; while "**C. floridana** (C. et R.) Nannf. n. sp.", with "Spec. orig.: Purpus Nr. 5237 [from San Luis Potosí, Mexico]" was described "Planta robusta . . . Petioli . . . usque ad 15 cm. longa" and specimens were cited from north through eastern Virginia into Maryland. In other words, Nannfeldt, although deriving his specific epithet from Coulter & Rose, applied it largely to the plant which they excluded from their *C. asiatica* var. *floridana.* This difference arose through Nannfeldt's feeling that the Maryland and Virginia material had fruits somewhat broader, "4.5–5.0 mm." broad, while his *C. repanda* should have them "3.5–4.0 mm." broad. I have tried this character and get no satisfaction from it. Nannfeldt states that his description of the fruit of *C. repanda* was made from a Lindheimer specimen from Texas, from at least 800 miles away from the TYPE region in eastern South Carolina. His description of the fruit of his *C. floridana* was made, not from the Jacksonville TYPE, but from a specimen from San Luis Potosí, more than 1100 miles from Jacksonville and in a very different vegetational area. The Purpus plant, as represented in the Gray Herbarium, does have some fruits nearly 5 mm. broad; the TYPE number of *C. floridana* (*Curtiss,* no. 988) shows, in the Gray Herbarium sheet, fruits down to 3.5 mm. broad. The futility of struggling to recognize two species here is evident.

A word should be said regarding *Hydrocotyle cordata* Walt. Fl. Carol. 113 (1788). This name occasionally appears, with indication of doubt, in synonymy of *Centella erecta.* Walter had four species under *Hydrocotyle* and I am under obligation to my friend Ramsbottom for a very clear photograph of the four as represented in the Walter herbarium at the British

Museum. *H. umbellata* L. and *H. americana* L. were correctly described and are represented by characteristic specimens. *H. reniformis* Walt. was clearly described, with the generic characters of *Centella* and the tuft of long-petioled leaves was annotated (apparently by the late Keeper, James Britten) "*H. asiatica* (*repanda*)". Returning to *H. cordata*, described merely "foliis cordatis integris erectis", the specimen is a single characteristic leaf, correctly identified in the same hand as the last, "*Limnanthemum trachyspermum.*" Walter's *Hydrocotyle cordata* long antedated *Villarsia cordata* Ell., basis of *Nymphoides cordatum* (Ell.) Fernald in Rhodora, xl. 338 (1938). The latter name, under *Nymphoides*, cannot now be changed. *Hydrocotyle cordata* Walt., being of the same date and published in the identical volume with *Anonymus aquatica* Walt., cannot disturb the name *Nymphoides aquatica* (Walt.) Ktze. for the coarse southern species.

Zizia **trifoliata** (Michx.), comb. nov. *Sison trifoliatum* Michx. Fl. Bor.-Am. i. 168 (1803). *Z. aurea*, var. *Bebbii* Coult. & Rose in Bot. Gaz. xii. 138 (1887). *Z. Bebbii* (Coult. & Rose) Britton in Mem. Torr. Bot. Cl. ii. 35 (1890).

In view of the similarity of various species of *Zizia* and of *Thaspium* in the flowering condition it is most regrettable that the rule of priority of specific epithets forces upon a species of *Zizia* the specific epithet *trifoliata* when there is also a *Thaspium trifoliatum* (L.) Gray. Fortunately, however, the two species are quite dissimilar in appearance in the flowering condition. They will not be confused in fruit and foliage. *Sison trifoliatum* Michx. was from the high mountains of Carolina. That it is the plant generally known as *Z. Bebbii* will be clear from the photograph of the type, × ½ (our plate 623, fig. 1). Fig. 2 is a portion, × ½, of characteristic *Z. Bebbii* from Warm Springs, Georgia, *Tracy*, no. 8917.

Breweria **patens** (Desr.), comb. nov. *Convolvulus patens* Desr. in Lam. Encycl. iii. 547 (1789).

Breweria patens has been generally confused with *B. trichosanthes* (Michx.) Small. The latter species, resting nomenclaturally on *Convolvulus trichosanthes* Michx. Fl. Bor.-Am. i. 137 (1803), was described as having fascicles of 1–5 flowers, but

Photo. H. G. Fernald.

Rubus paludivagus: fig. 1, branches of vigorous floricane, × 1; fig. 2, portion of typical floricane, × 1; fig. 3, calyx and pedicel, × 5.

Photo. H. G. Fernald.

Zizia trifoliata: fig. 1, type, × ½, of *Sison trifoliatum* Michx.; fig. 2, characteristic plant, × ½, of *Zizia Bebbii* (Coult. & Rose) Britton.

the type shows all the peduncles with 3–5 flowers and is a good match for extremely large specimens of *B. aquatica* (Walt.) Gray. Desrousseaux beautifully described the very slender plant of sandy pine barrens and openings from North Carolina to northwestern Florida (our PLATE 624), with widely divergent 1-flowered peduncles and linear leaves. His material, sent by Fraser from Carolina, was characterized: *"Convolvulus filiformis suberectis foliis linearibus, mucronatis; pedunculis patentissimis folio longioribus"* and his fuller account emphasized the obtuse leaves about 1 inch long and 2 lines broad, solitary flowers on horizontally divergent peduncles with 2 oval to lanceolate bracts at summit, the sepals oval and pointed. That it is not the *Convolvulus trichosanthes* Michx. (= *Breweria aquatica*) is clear from PLATE 624, FIG. 1, showing a portion, × ½, of Desrousseaux's type. FIG. 2 is from a plant, × 1, from Liberty County, Georgia, *Wiegand & Manning*, no. 2632.

The following specimens are referred to *B. patens*. NORTH CAROLINA: dry open pine woods, 2 miles south of Pinebluff, Moore Co., *Wiegand & Manning*, no. 2631; sandhill, 12 miles north of Laurinburg, Scotland Co., *Godfrey*, no. 5047; sand-ridge at Carolina Beach, New Hanover Co., *Godfrey*, no. 4705; sand-ridge, 5 miles west of Clinton, Sampson Co., *Godfrey*, no. 4495. CAROLINA: without designation of locality, FRAZER, TYPE (see PLATE 624). GEORGIA: sandy roadside, 4 miles southwest of Hinesville, Liberty Co., *Wiegand & Manning*, no. 2632; sandy soil near Augusta, *Biltmore Herb.* no. 14953[d]. FLORIDA: dry pine barrens, De Funiak Springs, *A. H. Curtiss*, no. 5903 (distrib. as *Evolvulus sericeus* Sw.); De Funiak, *Tracy*, no. 9198.

HOUSTONIA **nigricans** (Lam.), comb. nov. *Gentiana nigricans* Lam. Encycl. ii. 645 (1786). *Houstonia angustifolia* Michx. Fl. Bor.-Am. i. 85 (1803).

The heretofore problematic *Gentiana nigricans* was described with "fleurs . . petites, purpurines ou bleuâtre, nombreuses, & disposée au sommet de la plante en cîme corymbiforme. Leur limbe est quadrifide & un peu pubescent à l'interieur." Lamarck had his doubts about it and really suspected the true generic affinity, commenting, "Il faudra peut-être la ranger parmi les *Houstonia*, avec lesquelles il paroît qu'elle a des rapports." PLATE 625, FIGS. 1 and 2 are the two plants, × 1, of the TYPE of *Gentiana nigricans;* FIG. 3 is a similar portion of *Houstonia*

angustifolia from Georgia, *Boykin,* near the type region of Michaux's species. That they are the same no one is likely to question.

Lactuca **biennis** (Moench), comb. nov. *Sonchus biennis* Moench, Meth. 545 (1794). *S. racemosus* Lam. Encycl. iii. 400 (1789), not *L. racemosa* Willd. Sp. Pl. iii. 1524 (1804). *Sonchus leucophaeus* Willd. Sp. Pl. iii. 1520 (1804) as to plant described but excluding synonyms *S. spicatus* Lam. and *Prenanthes autumnalis* Walt. *Mulgedium leucophaeum* Willd. DC. Prodr. vii^2. 250 (1838). *L. leucophaea* (Willd.) Gray in Proc. Am. Acad. xix. 73 (1883), not Sibth. (1833). *L. spicata* sensu Hitchc. ex Britt. & Brown, Ill. Fl. iii. 276 (1898), not *Sonchus spicatus* Lam. Encycl. iii. 401 (1789), basinym.

It is most difficult to understand how *Lactuca biennis,* the erect large-leaved plant with thyrsoid-paniculate inflorescence of erect heads with pale- or dirty-bluish to whitish ligules should have been confused with the beautifully described *Sonchus spicatus* Lam., with the diagnosis "*Sonchus pedunculatis squamatis nutantibus, spica longissima virgata, foliis runcinatis*" and with the full account of this "Nouvelle espèce très-distinguée de toutes les autres par la disposition de ses fleurs. Sa tige est haute de deux à trois pieds, très-simple . . . feuilles . . roncinées . . les supérieures sont fort étroites, linéaires-lancéolées, entières, plus petites que les autres. Les fleurs sont purpurines, penchées ou même pendantes . . & disposées en un épi effilé, très-long, & terminal . . . Cette espèce a été trouvée dans la Caroline méridionale par M. Fraser, qui nous l'a communiquée". Lamarck clearly described *Prenanthes autumnalis* Walt.; in fact he cited Walter's species as a probable synonym! Incidentally, Fraser could not have missed *Prenanthes autumnalis* in South Carolina; he could hardly have found *Lactuca biennis* there. Small gives the southern limit as in North Carolina, and the only specimens from that state are from the Blue Ridge counties. Lamarck was familiar with our plant. He clearly described it, with pyramidal panicle and with the sessile pappus russet, as *Sonchus racemosus.* The photograph of his type is perfectly characteristic; but unfortunately there is already a *Lactuca racemosa!* The identity of *Sonchus spicatus* is so apparent from Lamarck's lucid account that, since noting the error of identifying the coarse *Lactuca* with it, I have merely waited until I could get

Photo. H. G. Fernald.

Breweria patens: fig. 1, type, × ½, of *Convolvulus patens* Desr.; fig. 2, flowering plant, × 1, of *Breweria trichosanthes* sensu Small, not *Convolvulus trichosanthes* Michx.

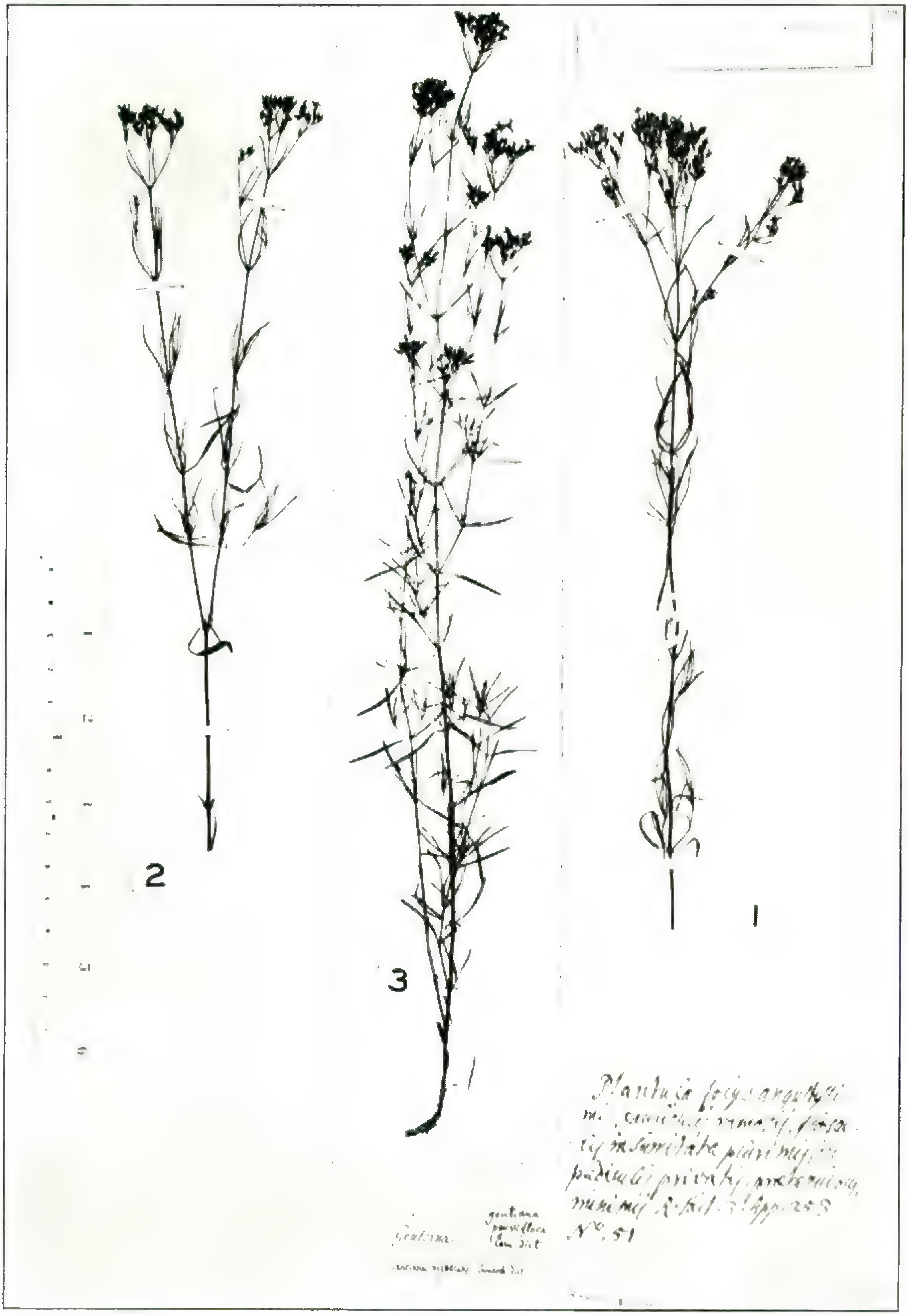

Photo. H. G. Fernald.

HOUSTONIA NIGRICANS: FIGS. 1 and 2, TYPE of *Gentiana nigricans* Lam., × ½; FIG. 3, characteristic branch of *Houstonia angustifolia* Michx, × ½, from Georgia.

a photograph of Lamarck's type before attempting to clarify the situation. The photograph of the type of *Sonchus spicatus*, received through the coöperation of Professor Humbert and Messrs. Metman and Cintract,[1] is conclusive; the clarification is only tentative.

The identity of the many North American plants described in the 18th and early years of the 19th centuries by European authors under *Lactuca, Sonchus* and *Mulgedium* are quite impossible to decipher from the meager descriptions alone. Yet, until they can be painstakingly studied, with fully representative American specimens for comparison, we can only take the statements of others regarding them. In modern would-be exact taxonomy no saying is more true than "you can trust nobody". In the present instance the untrustworthiness of past identifications is patent. The confusion seems to have started with the great and almost unexcelled scholar, A. P. DeCandolle, who, correctly describing *Mulgedium leucophaeum* (Willd.) DC. Prodr. vii². 250 (1838), "caule erecto glabro apice paniculato, . . . paniculae ramis racemosis . . . Capitula . . juniores albi demùm coerulescentes", cited *Sonchus spicatus* as a synonym but with the comment: "Nomen Lamarckii etiamsi vetustius sed falsum omisi". Starting with DeCandolle, the misidentification of *S. spicatus* has stood uncorrected for more than a century. Asa Gray, calling the coarse species of *Lactuca, L. leucophaea*, wrote in 1883, "The large synonymy of this species may be still further extended; for it must be the *S. racemosus* as well as *S. spicatus* of Lamarck, *S. biennis* of Moench, and it may also be *S. multiflorus* Desf."—Gray, Proc. Am. Acad. xix. 73 (1883). These with other synonyms and "*sensu*" names appeared under *L. leucophaea* (Willd.) Gray in the Synoptical Flora. As indicated in the opening paragraph of this note, the latter name is a later homonym. Some other names are similarly disbarred. Other names treated by Gray as synonyms, such as *S. pallidus* Torr., seem very doubtfully identified. Torrey's brief account called for a *yellow*-flowered plant of *fields*, with lanceolate-ensiform leaves and flowering in July. That sounds like some

[1] A package of photographs of types, arranged for two years ago, was mailed in Paris on September 1 and was delivered in Cambridge on December 6, 1939, more than 3 months en route!

form of *Lactuca canadensis.* The identity of *Sonchus biennis* Moench is not absolutely established but Gray had no doubt about it; and Moench's comparison of it with *S. alpinus* L., a European species with which our plant was much confused by early European authors (including Linnaeus) makes the identification reasonable. I, therefore, take up *L. biennis,* at least until Moench's type at Marburg can be examined. At any rate, we can use for our plant neither of the familiar names, *L. leucophaea* nor *L. spicata.*

The following forms should be noted.

L. biennis, forma **integrifolia** (T. & G.), comb. nov. *Mulgedium leucophaeum,* β. *integrifolia* T. & G. Fl. ii. 499 (1843). *L. spicata,* var. *integrifolia* (T. & G.) Britton in Mem. Torr. Bot. Cl. v. 350 (1894). *L. spicata,* var. *aurea,* forma *integrifolia* Jennings in Ann. Carnegie Mus. xiii. 443, pl. 33 (1922).

L. biennis, forma **aurea** (Jennings), comb. nov. *L. spicata,* var. *aurea* Jennings, l. c. 440 (1922).

III. ON TWO WEEDY CRUCIFERS

Reed C. Rollins[1]

During the last few years, weed specialists and agronomic botanists in America have become aware that two species of pernicious crucifers were passing in weed-surveys and bulletins as the same plant. Weed-manuals have usually given the common name of these plants as "hoary cress" or in some cases as "white-top". From the striking similarity of the two species, which have frequently been found growing in the same field, it is no wonder that they have been confused. Yet, taxonomically, the two have usually been known in separate genera under the names of *Lepidium Draba* L. and *Hymenophysa pubescens* C. A. Meyer. Both are introductions from the Old World and are apparently spreading rapidly, particularly in western North America. Repeated queries regarding the systematic position of these species have prompted a detailed examination of each with a view to determining their generic relationships.

Historically, *Lepidium Draba,* so-called, has often been thought of as an aberrant species in the genus *Lepidium.* Lin-

[1] Society of Fellows of Harvard University.

naeus himself in the tenth edition of his Systema and second edition of Species Plantarum shifted it from *Lepidium* to *Cochlearia.* Since that time, "*L. Draba*" or one of its numerous subspecies, varieties or forms has been placed, by different authors, in no less than five genera[1] other than *Lepidium.* Almost without exception, treatments of *Lepidium* have either excluded "*L. Draba*" or placed it by itself in a separate section or subsection of the genus. Thus, nearly everyone who has dealt with the plant has been impressed by its singular peculiarities and was not satisfied to give it equality with the general run of species in *Lepidium.* Some of the salient points of difference between "*L. Draba*" and the other species of *Lepidium* may be summarized as follows: 1, the fruits of "*L. Draba*" are indehiscent, those of *Lepidium* are dehiscent; 2, the siliques of "*L. Draba*" are neither strongly flattened nor carinate-margined, while in the rest of *Lepidium* the siliques are strongly flattened contrary to the narrow septum and the margins are either carinate or at least strongly compressed; 3, the siliques of "*L. Draba*" are somewhat inflated (markedly so in var. *repens*), whereas the siliques of *Lepidium* proper are uninflated; 4, the nectar-glands in "*L. Draba*" are comparatively large and well developed, completely surrounding the base of the single stamens and subtending the paired stamens but in the rest of *Lepidium* the nectar-glands are small, poorly developed, merely subtending the single stamens and only weakly developed below the paired stamens, or are absent entirely. According to Schulz,[2] myrosin-cells are found in the vascular bundles of "*L. Draba*", but none have been found in the vascular bundles of those species of *Lepidium* proper which have been investigated. Although the latter point does not have any practical taxonomic importance, it adds weight to the evidence against a presumed close direct relationship between "*L. Draba*" and other species of *Lepidium.* Taking all available evidence into consideration, it appears to be a mistake to continue "*L. Draba*" as a species in the genus *Lepidium.* The earliest generic name to which this species may

[1] *Nasturtium,* Crantz, Crucif. 91 (1769); *Cardaria,* Desvaux, Journ. de Bot. **3**: 163 (1814); *Draba,* Baumg., Enum. Stirp. Transilv. **2**: 232 (1916); *Cardiolepis,* Wallr., Sched. Crit. 340 (1822); *Physolepidion,* Schrenk, Enum. Pl. Nov. 97 (1841).

[2] Engler's Pflanzenf. **17b**: 416 and 476 (1936).

be referred is *Cardaria* of Desvaux l. c., hence the plant in question should be known as *Cardaria Draba* (L.) Desv.

The striking habital resemblance between *Cardaria Draba* and *Hymenophysa pubescens* suggests a closer relationship between the two than has usually been admitted. A detailed study of *H. pubescens* has not revealed a single valid reason for its not being considered congeneric with *C. Draba*. The siliques of *H. pubescens* are inflated and indehiscent; the seeds are large and have incumbent cotyledons; there is only one seed in each loculus of the ovary; the petals are broad-limbed and narrow-clawed as in *C. Draba;* and the style is of the same type as that found in the latter species. Most authors have separated *Hymenophysa* from *Lepidium* on the basis of its subglobose inflated silique and broad septum, but these characteristics are shared also by *C. Draba* var. *repens*, and to a lesser extent by typical *C. Draba*. The most important character which *Cardaria Draba* and *Hymenophysa pubescens* have in common is an indehiscent silique. In the species of *Lepidium* with which I am familiar, the siliques are definitely dehiscent. The extent of development and disposition of the nectaries of *C. Draba* and *H. pubescens* are similar, and both species possess myrosin-cells in their vascular bundles which seemingly further indicates close relationship. The available evidence indicates that *H. pubescens* should be placed in the genus *Cardaria*, which I should constitute as follows:

1. Cardaria Draba (L.) Desv.; based on *Lepidium Draba* L., Sp. Pl. **2:** 645 (1753). Type species of the genus.

The oldest American specimen of *C. Draba* in the Gray Herbarium, is *E. L. Greene no. 783*, collected near Yreka, California, in 1876. The species is now widely distributed in North America as a noxious weed. It is particularly troublesome in the slightly alkaline soils of many irrigated districts in western America, though it is by no means restricted to this type of habitat. Specimens of *C. Draba* have been seen from Nova Scotia, Massachusetts, Connecticut, New York, New Jersey, District of Columbia, Illinois, Nebraska, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, California, Oregon and Washington.

1a. C. Draba (L.) Desv., var. repens (Schrenk) O. E. Schulz; based on *Physolepidion repens* Schrenk, Enum. Pl. Nov. 97 (1841).

Specimens of the variety have been seen from Alberta, South Dakota, California, Oregon and Washington. O. E. Schulz, l. c., has named these plants forma *macrocarpa,* but the additional epithet is not necessary for a clear understanding of variety *repens.*

2. C. **pubescens** (Meyer), comb. nov.; based on *Hymenophysa pubescens* C. A. Meyer in Ledeb. Ic. Pl. **2:** 20 (1830) tab. 165, and Fl. Alt. **3:** 181 (1831).

The plants of this species which have been introduced into North America are not typical of the species as originally described or of specimens coming from Central Asia. Our weeds have a much more elongated fruiting raceme and smaller siliques than those described and figured by Meyer, l. c., and by Busch.[1] There are four specimens of *C. pubescens* from the Altai region in the Gray Herbarium, all of which have a short dense raceme, compact subcorymbose inflorescence and larger siliques than specimens from North America. On the other hand, a specimen collected in 1939 in the territory of Neuquen, Argentina by A. Chicchi, is typical of the Altai plants. The Argentina collection, so far as I am aware, is the first collection of this weedy crucifer from South America. It should be pointed out that Schulz's illustration in Die Pflanzenfamilien[2] is of the plant which we now have as a weed in the United States and Canada. His figures so nearly match specimens collected in Idaho by Mrs. Soth, which were known to have been sent to him at the Berlin Herbarium,[3] that it is not improbable that these drawings were actually taken from Idaho-grown material. As near as I have been able to learn, the weedy *Cardaria pubescens* as found in North America is an undescribed variety which perhaps originally came from some area south and west of the Altai district of central Asia. Import-records indicate that the seeds of these plants were brought to America as impurities in Alfalfa seed.[4] The variety which is extant in North America is named as follows:

[1] Fl. Sib. et Orient. Extr. 107 (1913).

[2] Engler's Pflanzenf. 2 Aufl. **17b**: 477 (1936).

[3] Science **62**: 509 (1925).

[4] Mr. Herbert Groh of Ottawa is actively interested, and has a forthcoming paper on this subject.

2b. C. pubescens (Meyer) Rollins, var. **elongata** var. nov. Herba perennis; inflorescentiis 4–10 cm. longis; siliquis 2.5–3.5 mm. latis. Michigan: Ypsilanti, June, 1919, *C. Billington* s. n. (G); Aug., 1919, *B. A. Walpole* s. n. (G). Idaho: Pocatello, July & Aug., 1925, *Mrs. M. E. Soth* s. n. (G, NY, US). Wyoming: near Powell, Park Co., June, 1933, *Rollins 324* (R). Colorado: Fort Collins, *B. Thornton 1* (US); near La Jara, Aug., 1926, *M. W. Talbot* s. n. (US). California: edge of an alfalfa field, near Sacramento, June, 1932, *Bellue* s. n. (US). Oregon: near Redmond, Sept., 1922, *Whited 499* (G); near Burns, Harney Co., July 9, 1933, *J. W. Thompson 11960* (G, type; NY, US, *isotypes*); Klamath Falls, June, 1923, *Applegate 3603* (G). Washington: roadside south of Ellensburg, June, 1933, *Thompson 9047* (G, US); May, 1935, *Thompson 11539* (G, NY, US); near Tonasket, June, 1931, *Thompson 7107* (G, US); wheat field, Pullman, July, 1925, *R. F. Haxton* s. n. (G). Presumably the same plant has been reported from Pennsylvania by J. M. Fogg, Jr.,[1] but I have not seen specimens of the collections cited. Our plants are neither of the following species which have not turned up as weeds in North America.

Although I have not seen specimens of *Hymenophysa fenestrata* and *H. macrocarpa*, judging by their descriptions and notes concerning them, they are also to be included in *Cardaria*.

3. C. **fenestrata** (Boiss.), comb. nov.; based on *Hymenophysa fenestrata* Boiss. in Ann. Sci. Natur. Bot. **17**^{2}**:** 197 (1842). Turkestan.

4. C. **macrocarpa** (Franch.), comb. nov.; based on *Hymenophysa macrocarpa* Franch. in Ann. Sci. Natur. Bot. **15**^{6}**:** 233 (1883). Persia.

CONTRIBUTIONS TO THE BOTANY OF MICHIGAN NO. 17

Oliver A. Farwell

This number of the Contributions deals with new varieties and with plants that are, as far as my knowledge goes, recorded for Michigan for the first time and extensions of range.

I extend my sincere thanks to Prof. M. L. Fernald for timely suggestions and comments.

Panicum boreale Nash, var. **michiganense,** n. var., *foliis subtus et vaginis plus minusve pubescentibus pustulatis paginis supra hirsutis et nodorum dorsis ad vaginarum apices pubescenti-*

[1] Rhodora **39:** 190 (1937).

bus.—Foliage pubescent, the underside of the leaves and the sheaths papillose-pubescent and the backs of the nodes between the leaves and their sheaths pubescent, usually densely white-pubescent toward the margins.—WAYNE Co.: Detroit, no. 1425 (TYPE, in my herbarium) August 25, 1893. Oakland Co.: Orion, no. 5050, July 7, 1918. Keweenaw Co.: Cliff Mine, nos. 643, August 8, 1888 and 11355, July 16, 1936.

The specific type of this species is said to be glabrous except for some marginal ciliation at the base of the leaves and the lowest papillose sheath.

POA ANNUA L., var. REPTANS Haussknecht. This is an unusual form for an ordinarily annual plant; it is perennial by means of the prostrate culms which take root and produce new plants at their nodes. Much branched. Occasional, but may be found to be more prevalent than is supposed if search is made for it. In moist grounds in ravines, on lake shores, and in cultivated grounds. HOUGHTON Co.: Douglas Houghton ravine, no. 10859, June 18, 1935; shores of Torch lake, no. 11924, May 17, 1939; Lake Linden, no. 12248, October 6, 1939.

CALAMAGROSTIS LACUSTRIS (Kearney) Nash. Kearney cited Porter's collection from Isle Royale (Keweenaw Co.) in his original description; but I believe this is the first record from the mainland of Michigan. HOUGHTON Co.: n. w. shores of Rice lake, no. 12168, September 11, 1939.

CALAMAGROSTIS CANADENSIS (Mx.) Beauv. var. MACOUNIANA (Vasey) Stebbins. The following records nearly fill up the gap between its recorded eastern and western ranges, making the range, except for New York, continuous from the Rocky Mountain region to the Atlantic. WAYNE Co.: Belle Isle in Detroit River, no. 1502a, June 2, 1896; Wayne, no. 9151, July 6, 1932. OAKLAND Co.: Rochester, no. 8580, September 10, 1929. KEWEENAW Co.: lake Glazon woods, no. 12224½, September 25, 1939.

NEMOPANTHUS MUCRONATA (L.) Trel., var. **chrysocarpa,** n. var., *fructu flavo pallido, majore.*—Differs from the ordinary red-fruited type in its slightly larger, pale yellow fruit.—In swampy ground. HOUGHTON Co.: vic. Rice lake, no. 12140 (TYPE, in my herbarium) August 30, 1939.

PENTSTEMON LAEVIGATUS Ait., var. DIGITALIS (Sweet) A. Gr. The usual range is from Maine southwestward in a broad belt to Iowa, Oklahoma and Texas. This record extends the range far to the north, it being the first time reported from the Upper Peninsula of Michigan. HOUGHTON Co.: Sawmill Creek valley, Earnest Kilmer of Lake Linden, Michigan, July 11, 1939. O. A. Farwell, no. 11990, July 18, 1939.

Parthenium integrifolium L. Plentiful in clearings at the place cited below. Not before recorded for Michigan. Keweenaw Co.: Agate Harbor Mine, the Misses *Ruth and Frances Lyon* of Calumet, Michigan, September 20, 1939 and *O. A. Farwell*, no. 12236, September 29, 1939.

Lake Linden, Michigan

A Globose Form of Pitch Pine (Pinus rigida) in Virginia. —Pinus rigida Mill. forma **globosa,** forma nov. Arbor globosa compacta; foliis normalibus; strobilis 4.5–5.5 cm. longis, 4.8–5.3 cm. latis, quam eis speciei paullo minoribus.—Virginia: single tree in pasture just south of Hopewell Gap, Bull Run Mountain, Fauquier Co., March 10, 1940, *Allard* 7587 (type no. 1,785,345, U. S. National Herbarium; duplicates in National Arboretum Herbarium, Gray Herbarium, Arnold Arboretum), also 4351, 5688, 6119.

The dimensions of this particular tree are as follows: Height 7 feet, 6 inches; spread of crown 12 feet; diameter of trunk at ground 6.5 inches. This tree developed cones while very small, some of these originating on twigs just above the ground. These are variable in size, the smallest ranging from 1¼ to 1½ inches in length; the largest 2 to 2¼ inches in length.

The specializations and relationships of the fibrovascular bundles, the number and distribution of the resin canals, etc., as determined by microtome cross sections of the needles of this globose form appear to be no different from those of trees of normal growth habit.

The Pitch Pine is of more or less general occurrence as an element of the wooded slopes throughout Bull Run Mountain. It is also an important element of the old field successions everywhere in this area, in many places competing with the Virginia Pine (*Pinus virginiana*), the only other species of pine colonizing in old fields here.—H. A. Allard, Department of Agricuture, Washington.

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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. CXXXII

A LIST OF PLANTS FROM INTERIOR ALASKA[1]

Edith Scamman

Of the great territory of Alaska—in extent equal to one-fifth the size of the United States—the Interior has received little attention from botanists. In Southeastern Alaska, the Aleutian Islands, and the Bering Sea region, many collections have been made and reports published, since the earlier years of Russian occupancy. Ledebour's "Flora Rossica" remains today a most valuable work for all students of Alaskan plant life.

But the vast Interior, cut through by the Yukon River—a natural highway for the gold seekers and adventurers of early days—and its drainage system, including the valleys of the Tanana and the Koyukuk Rivers, with Mt. McKinley Park as the southern boundary, contains a great wealth and variety of plants. Much of the region is unglaciated, except locally, and has, therefore, afforded a safe and secure home in which plant species have lived undisturbed for countless ages. On the mountains of this old region may be found growing in close proximity arctic-alpine plants, many circumpolar, cordilleran species of the Rocky Mts. and British Columbia, and Asiatic types, "transgressing" seven or eight hundred miles inland from the coast of Bering Sea. The distribution of plants in the Interior is, therefore, of considerable interest, and this list includes new localities and extensions of range for many species.

[1] Cost of publication defrayed by the author.

The summers of 1936 and 1937 were spent by the writer in Alaska for the purpose of collecting specimens for the Gray Herbarium. Small collections were made in Juneau and Seward, but are excluded here, as this list covers only vascular plants of the Interior, obtained from a number of different localities: Mt. McKinley National Park; Black Rapids, on the Richardson Highway, extending from the coast to Fairbanks; Fairbanks; Miller House, Eagle Summit, and Circle Hot Springs, all three near the Steese Highway, the only road from Fairbanks, the metropolis of the Interior, to Circle City on the Yukon; and Wiseman, the "Arctic Village" on the Middle Fork of the Koyukuk. The stations in this area extend from McKinley Park, 63° 43′ no. lat., to Wiseman, about 67° 30′ no. lat.

Mt. McKinley Park

Two visits were made to the Park, one of three days only, July 5–7, 1936, and a longer period, June 13–22, in 1937. Spring was late in Alaska in 1937, and when I reached Savage River Camp, twelve miles from the railroad entrance to the Park, on June 13th, practically nothing was in bloom. From a collector's point of view it looked quite hopeless. But several days of warm weather with sunshine much of the night, causing underground ice to thaw and surface snow to melt, resulted in an almost unbelievable transformation. The stony banks of the Savage River, with swamp sand beyond, and open, parklike woods behind the Camp, were masses of brilliant color—Silene, Anemones (four species), Delphinium, Aconite, Papaver, Parrya, Drabas, Saxifragas, Dryases, Potentillas, Rhododendron, Lupine, Dodecatheon, Mertensia, and Polemonium. As I was eager to get farther north, I remained in the Park only long enough to collect 115 species. The majority of these were obtained within two or three miles of the Camp. A day's trip to the Rangers' cabin at Igloo, Sable Pass and Polychrome Pass yielded a few less common finds—*Viola biflora, Draba alpina, Potentilla nivea* and, on a rock pile near Sable Pass, *Astragalus falciferus* and several critical species of *Oxytropis*. A clump of pinkish-purple *Douglasia* in bloom at Polychrome Pass was the chief reward for the days spent at the Park.

Rapids

An impressive demonstration of the forces of nature was staged at Rapids on the Richardson Highway between my two visits there, August 7–10, 1936, and August 25–28, 1937. The Hunting Lodge is

situated on the Big Delta River, 138 miles south of Fairbanks, on the northeastern slopes of the Alaska Range, elevation 2130 feet. In 1936 a small glacier could be seen from the Lodge, merely as a glittering spot of ice high up in the mountains. A year later it had become a "runaway" glacier, had moved downward five miles, taking shrubs and all other vegetation with it, and stopped, a great wall of ice 300 feet high, on the opposite bank of the Big Delta.

On a dry, rocky bluff near the river a new variety of *Lesquerella arctica* grew in abundance. Tiny, low-growing *Saxifraga Eschscholtzii*, and *Woodsia alpina* and *Crepis nana* were also collected at Rapids, with other plants one would expect to find in the two habitats—spruce and birch woods bordering the swift-flowing glacial streams, and the mountain-sheep "pastures" at higher altitudes above the tree line.

Miller House

A brief acquaintance with the plants of Eagle Summit, seven miles from Miller House, in 1936, made me realize the fine possibilities for collecting arctic-alpine plants there. So I returned the following year, happy to be back with my kind, hospitable friends, Mr. and Mrs. Frank Miller. There in a tiny log cabin next door to the roadhouse, post-office, and general store—all three in one—I remained from July 2 to 26. In the center of the "Circle diggings," 116 miles north of Fairbanks, this roadhouse is located in a valley, through which flow several mining creeks, Mammoth, Mastodon, and Miller.

Plants typical of the Interior valleys of an elevation of about 2000 feet were found here. Large clumps of the rusty-backed swords of *Dryopteris fragrans* shared the dry hillsides above the creeks with *Arctostaphylos Uva-ursi* and *A. rubra*, *Vaccinium Vitis-Idaea*, var. *minus* (Mountain Cranberry), *Empetrum nigrum*, *Pedicularis labradorica*, *Geocaulon lividum*, *Silene repens*, *Arnica attenuata*, *Saxifraga tricuspidata* and *Arenaria obtusiloba*. In the open tundra below were white pools of *Eriophorum* with *Carices*, *Andromeda polifolia*, *Vaccinium uliginosum*, *Rubus Chamaemorus*, *Polygonum viviparum*, and the straight pink plumes of *P. Bistorta*. *Parnassia Kotzebuei* and *P. palustris*, var. *neogaea*, *Linnaea borealis*, and tangled *Hedysarum alpinum*, var. *americanum* were sheltered by willows and alders in moist shady spots. Flat patches of *Arenaria physodes* were abundant, and delicate *Crepis elegans*, with long tap-root, penetrated the spaces between the piles of round stones thrown up by mining operations. Along the

lower part of the trail from Miller House to Eagle Summit shrubs and tall, weed-like plants of the familiar roadside association flourished luxuriantly—*Rubus idaeus*, var. *canadensis, Potentilla fruticosa, Rosa acicularis, Senecio lugens, Aster sibiricus, Solidago multiradiata, S. decumbens, Polygonum alpinum*, var. *lapathifolium* and *Epilobium angustifolium.* The latter is the most striking and conspicuous plant in the Interior, covering the low hills around Fairbanks with masses of brilliant color, visible for miles.

Eagle Summit

An Alaskan "travelogue" describes Eagle Summit, elevation 3880 feet, as a barren summit, the highest point on the road between Valdez on the southwestern coast to Circle City on the Yukon. The extreme top is level, with disintegrated rock fragments, dry and barren, indeed. In winter it is bleak, wind-swept, and bitterly cold, and is considered one of the most difficult places to cross by dog team. But in July all the cave-like hollows and wet slopes form an alpine rock garden of great beauty. Large snow patches remain nearly all summer between the slopes—a favorite place for caribou to seek refuge from mosquitos and flies, as well as from the heat. The borders of wet, springy ground where water trickles down from the snow afford a perfect home for *Ranunculus nivalis*, also *Claytonia sarmentosa* and *C. tuberosa, Senecio Kjellmanii, Saxafraga Hirculus, S. foliolosa, Dodecatheon frigidum, Parrya nudicaulis, Cardamine purpurea,* and numerous others.

Slightly higher in the rocky crannies grow different species—two dwarf *Salices, Oxyria digyna, Arenaria arctica* and *Arenaria macrocarpa, Silene acaulis*, var. *exscapa, Ranunculus pygmaeus, Anemone narcissiflora, Cardamine bellidifolia, Saxifraga rivularis, S. punctata, S. bronchialis*, subsp. *Funstonii, Dryas octopetala, Cassiope tetragona, Gentiana glauca, Arnica Lessingii, Saussurea densa*, and *Antennaria alaskana.* Five species of *Pedicularis* were close neighbors in spongy ground near the base.

It was a delight to discover several rarer plants—*Campanula uniflora*, inconspicuous and easily missed; fragrant and charming *Eritrichium aretioides;* a pink and white *Papaver, Oxytropis Mertensiana,* the first record for the Interior and third for Alaska; and *Eutrema Edwardsii,* known usually from the northern coast. Here on the slopes of Eagle Summit circumpolar, Asiatic or North Pacific, and cordilleran species lived side by side.

Porcupine Dome

The red letter day of my two Alaskan summers came on July 12, 1937, when Mr. Miller and I climbed Porcupine Dome, the highest peak, elevation 4810 feet, of the whole region between Fairbanks and the Yukon. Wearing high rubber boots, our faces hidden by mosquito netting, and armed with a gun, for protection against unfriendly bears, we made slow progress across the "niggerheads." Our hike ended with a climb almost on hands and knees over the massive rock-pile to the flat plateau which formed the top of the Dome. There growing beside *Salix phlebophylla* and *Antennaria alaskana,* was a delicate little *Potentilla,* glabrous, with three-foliolate leaves. It proved to be *Potentilla elegans,* a rare plant of the mountains of Siberia, reported but once before on the North American continent, on the coast. Here it was more than 600 miles inland. It bears a close resemblance to a rare endemic of the White Mountains.

Potentilla biflora, found occasionally on the northwest coast, but rare in the Interior, had been collected on the way up. At a lower altitude in wet, springy ground below a snow patch were a few plants only of a single-flowered, purplish-magenta *Claytonia*—very characteristic and unlike any *Claytonia* I had seen either in the field or in the herbarium. This new species—recently described by Dr. Eric Hultén—and *Potentilla elegans* were enough thrills for one day, even though we missed meeting a grizzly.

Circle Hot Springs

This is the chief resort of Interior Alaska, 9 miles southeast of the Steese Highway and about 138 miles north of Fairbanks. The hot baths of healthful mineral water are very popular, as are also the fine vegetables grown in the neighborhood of the springs in the hotel garden. Plants with a more southern range are found here, growing luxuriantly around the springs, in spite of the nearness to the Arctic Circle. I spent only several days at the Hot Springs in 1936 (July 17–22), but was repaid by finding *Juncus filiformis,* not previously reported from Alaska, and northern extensions of range for several plants. *Caltha natans,* of rare and local distribution, grew in ditches with *Ranunculus Purshii,* subsp. *yukonensis.*

Wiseman

Wiseman is a small village of Eskimos and gold miners, on the Middle Fork of the Koyukuk, about 75 miles north of the Arctic

Circle. It is reached by a plane trip of 200 miles from Fairbanks. One night in 1936, July 12, I flew there and back to view the midnight sun, picking up a few common plants in the town. But most of my specimens, the first collected or recorded from Wiseman, were obtained from August 2–12, 1937. It was late in the season for the best collecting, however.

The river valley and ravines are well wooded with *Picea, Populus tacamahacca* and *Betula papyrifera,* with *Populus tremuloides* on higher altitudes in the hills. *Juniperus communis,* var. *montana* is occasional and *Betula glandulosa* very common, as it is everywhere throughout the Interior. Three Orchids grew abundantly in the woods about the town—*Cypripedium passerinum, Habenaria obtusata* and *Habenaria hyperborea. Spiranthes Romanzoffiana* was occasionally found, probably the most northern station on record. *Boschniakia rossica,* called "corn pipes" by the Eskimo children, is very plentiful. Masses of *Dryas Drummondii,* with beautiful feathery styles, lined "Main Street," and *Epilobium latifolium* gave color to the river bars. Three unusual "finds" were true *Oxytropis deflexa,* the second station in Alaska; the rare *Antennaria pulcherrima,* and *Artemisia alaskana.* This is the only report of the latter, with the exception of the type specimen from the lower Yukon. Most of the Wiseman plants are noticeable for their unusually tall growth, due probably to the rapid forcing by so many hours of sunlight.

A few specimens, labelled "Along the Yukon River," were collected when the steamer stopped to load at various wood-piles between Tanana and Eagle, August 20–27, 1936. *Astragalus yukonis* from Tanana is the most noteworthy.

The material from Fairbanks is scanty and not representative, as I gathered plants there only while waiting to go on to other places, so missed some, well-known and common. I have also included several from Curry, on the Alaska R. R. between Anchorage and the Park, too far south to be classed as truly in the Interior.

While in Alaska I appreciated the courtesy shown me by Professor Gasser of the University at Fairbanks, Mrs. Ada Sharples of Juneau, author of a popular Flora of Alaska, and Mr. J. B. Anderson, who kindly offered me while in Juneau, the use of his private herbarium, containing the largest and finest collection of Alaskan plants in the Territory.

My deepest appreciation is expressed to Professor Fernald for his generous encouragement, kindly interest and helpful guidance, without which this study of flora of the Alaskan Interior could not have been undertaken.

On a visit to the Gray Herbarium in 1938, Dr. Eric Hultén of Lund looked over many of my specimens, giving me valuable aid in their identification and record of distribution. He also took several critical species back to Sweden for later study, and has since kindly described and named the new Claytonia.

"Contributions to the Flora of Alaska," by A. E. Porsild, of Ottawa, in RHODORA, 1939,[1] has been a constant guide and inspiration. To him I am greatly indebted for identifying and annotating a number of my puzzling specimens, and for his generous and helpful advice in regard to this list.

It is a pleasure to express my gratitude to Mr. C. A. Weatherby for his assistance in the classification of the *Pteridophyta;* to Dr. Hugh M. Raup, the *Salices;* to Mr. Reed Rollins, the *Cruciferae;* and to Dr. G. Haglund, the *Taraxaca.*

LIST OF VASCULAR PLANTS COLLECTED IN INTERIOR ALASKA
(407 species and varieties, 847 numbers)

I. PTERIDOPHYTA

BOTRYCHIUM LUNARIA (L.) Swartz. Not common and seen only once. It may easily have been overlooked, however. Rapids, no. 28.

WOODSIA ILVENSIS (L.) R. Br. On exposed dry cliffs above the Susitna River. Curry, nos. 2 and 565.

W. ALPINA (Bolton) S. F. Gray. Crevices in rocks overhanging Gunnysack Creek. Rapids, no. 1.

Plants in this collection have straw-colored stipes, as is often the case in typical *W. alpina* of the Old World, which in all other characters they resemble.

W. GLABELLA R. Br. Frequent around Wiseman on moist rocks and in damp, mossy hollows shaded by overturned tree roots, no. 871.

CYSTOPTERIS FRAGILIS (L.) Bernh. Abundant in shaded ravines. This semicosmopolitan fern grows luxuriantly in many places. Park, no. 575; Rapids, no. 4; Circle Springs, nos. 3 and 6.

PTERETIS NODULOSA (Michx.) Nieuwl. *Onoclea nodulosa* Michx. In alder thickets along the Susitna River, sometimes reaching the height of six feet. Curry, no. 564; Fairbanks, no. 7.

DRYOPTERIS FRAGRANS (L.) Schott. *Thelypteris fragrans* (L.) Nieuwl. Apparently the most common fern of the north-central In-

[1] Porsild, A. E., RHODORA 41: 141–183, 199–254, 262–301 (1939).

terior. At Miller House hundreds of plants grow on dry, stony hillsides, nos. 15 and 700; Park, no. 574; Circle Springs, no. 14; Wiseman, no. 872.

D. spinulosa (O. F. Müll.) Watt, var. dilatata (Hoffm.) Watt. See Fernald, Contrib. Gray Herb. **76**: 147 (1926), for discussion of *D. spinulosa* and *D. austriaca.* Common in southern Alaska along the coast, but rare in the central Interior. Circle Springs, no. 17.

D. spinulosa (O. F. Müll.) Watt, var. americana (Fisch.) Fernald, in Rhodora **17**: 48 (1915). Rare. Circle Springs, no. 16. Scales on stipe and a few on rachis, pale brown, concolorous.

D. Phegopteris (L.) C. Chr. *Phegopteris polypodioides* Fée; *Thelypteris Phegopteris* (L.) Slosson. Common in southern Alaska, but rare in the Interior. Rich woods by the river. Curry, no. 12.

D. Linnaeana C. Chr. *Phegopteris Dryopteris* (L.) Fée; *Thelypteris Dryopteris* (L.) Slosson. Rare in cool, moist woods. Circle Springs, no. 10; Wiseman, no. 913. These specimens have a few glands on the rachis, and belong with forma glandulosa Tryon in Fern Jour. **29**: 4 (1939).

Athyrium Filix-femina (L.) Roth ex Mertens, var. sitchense Rupr. ex Moore. Abundant and of tall, luxuriant growth near the hot springs. Circle Springs, no. 19. Forma strictum (Gilbert) Butters, no. 20.

Equisetum arvense L. Common and widely distributed. Fairbanks, no. 34; Miller House, no. 30; along Yukon River, no. 31; Wiseman, no. 29.

E. pratense Ehrh. In willow and poplar thickets along banks of sloughs. Fairbanks, no. 1082.

E. sylvaticum L. See Fernald in Rhodora **20**: 129 (1918). Often in woodland. Park, no. 576; Fairbanks, no. 33; Circle Springs, no. 32.

E. palustre L. Abundant on mud bars and in shallow water. Fairbanks, no. 860; Wiseman, no. 873.

E. fluviatile L. In sloughs and ponds. Fairbanks, nos. 34-a, 860-a; Miller House, no. 702.

E. variegatum Schleich. Occasional along borders of creeks. Miller House, no. 701; Wiseman, no. 874.

Lycopodium Selago L. Frequent on mossy ledges in alpine situations. Park, no. 577; Rapids, no. 1044; Eagle Summit, nos. 35, 703.

L. annotinum L. Damp, rich woods. Rapids, no. 1043.

L. annotinum L., var. pungens (La Pylaie) Desv. In drier places. Eagle Summit, nos. 37, 704; Circle Springs, no. 36; Wiseman, no. 876.

L. clavatum L. Park, no. 578. Var. monostachyon Grev. & Hook. On dry ledges in hillside graveyard. Wiseman, nos. 40, 877.

L. complanatum L. Circle Springs, no. 41; in open woods on higher slopes, Wiseman, no. 875.

Selaginella sibirica (Milde) Hieron. See Hultén, Fl. Aleut. Isl. 62 (1937). On dry, bare cliffs. Wiseman, no. 878.

II. Spermatophyta

Gymnospermae

Picea glauca (Moench) Voss, and Picea mariana (Mill.) B.S.P. constitute the coniferous forests of the Interior.

Larix laricina (DuRoi) Koch. Occasional in swamps. Fairbanks, no. 43.

Juniperus communis L., var. montana Ait. *J. sibirica* Burgsd. On dry, gravelly slopes, not common. Park, no. 579; Wiseman, no. 879.

Angiospermae

Monocotyledonae

Triglochin palustris L. Common in marshes and along the rivers. Fairbanks, no. 46; Wiseman, no. 880.

Phalaris canariensis L. Introduced. Fairbanks, no. 1087.

Hierochloë odorata (L.) Wahlenb. Park, no. 580.

H. alpina (Sw.) Roem. & Schult. On alpine summits. Park, no. 581; Eagle Summit, no. 706.

Arctagrostis arundinacea (Trin.) Beal. In the hills above Wiseman, no. 881.

A. latifolia (R. Br.) Griseb. Miller House, no. 709.

Agrostis scabra Willd. Circle Springs, no. 48.

Calamagrostis canadensis (Michx.) Nutt., var. Langsdorfi (Link) Inman. *C. Langsdorffii* Trin. See Rhodora **24**: 143 (1922), and **32**: 43–44 (1930). Very common. Rapids, nos. 49, 1049; Miller House, no. 710; Wiseman, no. 882.

Deschampsia caespitosa (L.) Beauv. Fairbanks, no. 50.

Trisetum spicatum (L.) Richter. Miller House, no. 53.

Beckmannia Syzigachne (Steud.) Fernald in Rhodora **30**: 27 (1928). Widespread and common. Miller House, no. 707; Circle Springs, no. 54; Wiseman, no. 883.

Poa alpina L. Stony soil. Park, no. 604.

P. arctica R. Br. *P. rigens* Hartm. In alpine situations. Eagle Summit, nos. 55, 710-a.

P. alpigena (Fries) Lindm. Miller House, no. 708.

Glyceria grandis Wats. In sloughs about the Chena. Fairbanks, no. 56.

Festuca rubra L. Varies greatly. Rapids, no. 1050.

F. altaica Trin. Miller House, no. 705.

Bromus Pumpellianus Scribn. In dry ground around cabins. Fairbanks, no. 1086.

Agropyron latiglume (Scribn. & Sm.) Rydb. Rapids, no. 1053.

Hordeum jubatum L. Abundant around towns. A nuisance in Fairbanks where it grows everywhere along the sidewalks and in vacant lots. Tanana, no. 58; Wiseman, no. 885.

Elymus innovatus Beal. Common in dry fields and on the edges of woods. Rapids, nos. 60, 1052; Wiseman, no. 884.

Eriophorum opacum (Björnstr.) Fernald in Rhodora **7**: 85 (1905); **27**: 203–10 (1925). Very common in swampy ground. This and the following species form large "niggerheads" in the tundra. Park, no. 587; Circle Springs, no. 65; Wiseman, no. 888.

E. vaginatum L. Miller House, no. 713.

E. callitrix Cham. Occasional in bogs and along the edges of small ponds. Miller House, no. 712; Circle Springs, no. 63.

E. Scheuchzeri Hoppe. Miller House, no. 711; Wiseman, no. 887.

E. medium Anders. *E. Chamissonis* C. A. Meyer, var. *albidum* sensu Fernald. Rapids, no. 1048.

E. angustifolium Roth. Widespread and abundant in wet places. Miller House, no. 714; a larger form, no. 715; Circle Springs, no. 64; Wiseman, no. 889.

Scirpus americanus Pers. Circle Springs, no. 61.

Carex capitata L. Rare. In swamp near Fairbanks, no. 692.

C. disperma Dewey. *C. tenella* Schkuhr. Beside creek at Miller House, no. 718.

C. brunnescens Poir. Fairbanks, no. 693.

C. supina Wahlenb. Rare. Rapids, no. 1045.

C. scirpoidea Michx. Common. Park, no. 585; Rapids, no. 1046; Circle Springs, no. 69; Wiseman, no. 991.

C. scirpoidea Michx., var. convoluta Kükenth. Miller House, no. 719.

C. concinna R. Br. Park, no. 583.

C. capillaris L. Occasional on mossy banks. Rapids, no. 72; Wiseman, no. 886.

C. angarae Steud. Synops. Cyper. 190 (1855). *C. Vahlii* Schkuhr, var. *inferalpina* sensu Fernald in Rhodora **35**: 220–223 (1933), non Wahlenb. Very common. Rapids, no. 1047; Miller House, no. 717; Circle Springs, no. 75.

C. stylosa C. A. Meyer. Wiseman, no. 992. Probably first record for the Interior.

C. podocarpa R. Br. Park, no. 582; Eagle Summit, no. 720-A.

C. Tolmiei Boott. Park, no. 586; Miller House, no. 722.

C. atrosquama Mackenzie. Miller House, no. 725.

C. aquatilis Wahlenb. Common in swamps and along creeks and rivers. Miller House, no. 716; Circle Springs, no. 80; Wiseman, no. 993.

C. physocarpa Presl. Miller House, no. 724.

C. membranacea Hook. *C. membranopacta* Bailey. Common. Park, nos. 84, 584; Rapids, no. 85; Miller House, no. 723; Circle Springs, no. 83; Wiseman, no. 995.

C. rotundata Wahlenb. In low, marshy ground. Wiseman, no. 996.

C. rostrata Stokes. In a ditch in Fairbanks, no. 87.

Juncus bufonius L. Frequent along paths or roadsides. Fairbanks, nos. 89, 1085; Circle Springs, no. 88.

J. BALTICUS Willd., var. HAENKII (E. Mey.) Buch. Common in wet places. Park, no. 591; Fairbanks, no. 90; Wiseman, no. 998.

J. FILIFORMIS L. Rare. The first station for this slender *Juncus* reported in Alaska. Circle Springs, no. 93.

J. ALPINUS Vill. Fairbanks, no. 94.

J. CASTANEUS Smith. Abundant and widespread in the Interior. The most common Juncus in the places I visited. In marshy ground. Fairbanks, no. 96; Miller House, no. 726; Circle Springs, no. 95; Wiseman, no. 999.

LUZULA PARVIFLORA (Ehrh.) Desv. Alpine slopes. Park, no. 589.

L. CONFUSA Lindeb. Also an alpine species. Miller House, no. 729.

L. MULTIFLORA (Retz.) Lej. *L. campestris* (L.) DC., var. *multiflora* (Ehrh.) Čelak. Park, no. 588. Var. FRIGIDA (Buch.) G. Sam. *L. campestris*, var. *frigida* Buch. See Hultén, Fl. Aleut. Isl. 125 (1937). Miller House, no. 728.

L. JAPONICA Buch. Park, no. 590.

TOFIELDIA PALUSTRIS Huds. *T. minima* (Hill) Druce. Very common all through the central and northern Interior. Miller House, no. 102; Eagle Summit, no. 730; Circle Springs, no. 101; Wiseman, no. 890.

T. COCCINEA Richards. Found occasionally in higher, more alpine situations. Rapids, no. 103; Eagle Summit, no. 731.

ZYGADENUS ELEGANS Pursh. Abundant in grassy plains and thin, open woods. Rapids, no. 106 (in fruit), no. 1005 (in flower); Wiseman, nos. 105, 891.

ALLIUM SCHOENOPRASUM L., var. SIBIRICUM (L.) Hartm. *A. sibiricum* L. Occasional on sandy shores. On banks of the Yukon, Rampart, no. 107.

LLOYDIA SEROTINA (L.) Reichenb. This delicate little "Alp Lily" is rare in the mountains. A good-sized colony along the rocky shore of Savage River, Park, no. 592. A single plant was seen in a crevice at Eagle Summit.

IRIS SETOSA Pall. A tall, beautiful purplish-blue *Iris*, abundant along roadside ditches and on marshy ground in Fairbanks, no. 110 (in fruit), no. 688 (in flower).

CYPRIPEDIUM PASSERINUM Richards. Abundant in spruce woods along the Koyukuk River, Wiseman, no. 892.

As I was there in August my specimens were all in fruit, but the following year Tom Brady, a miner of Wiseman, sent me several in flower, no. 892-A.

C. GUTTATUM Swartz grows in Fairbanks. I saw mounted specimens there, but did not collect it myself.

? HABENARIA SP.

These plants, growing in marshland in Wiseman, no. 894, seem to

belong to the *Habenaria hyperborea* or *H. dilatata* group, as the lip is entire, about 5 mm. long, broader at the base and slightly dilated. Basal leaves are rather wide and obtuse, and the flowers greenish-white.

H. obtusata (Pursh) Richards. Occasional in rich woods. Rapids, nos. 112, 1006; Wiseman, no. 893.

Spiranthes Romanzoffiana Cham. & Schlecht. Rather rare and local. Circle Springs, no. 113; Wiseman, no. 895.

Several plants were found in moist ground on hills above the town. This is probably the most northerly station ever recorded for *S. Romanzoffiana.*

Calypso bulbosa (L.) Oakes. A mounted specimen, collected along the Steese Highway, was seen at the Tanana Valley Fair in Fairbanks.

Dicotyledoneae

Populus tremuloides Michx. The aspen is common in dry soils throughout the Interior. Here and there in the hills above Wiseman, no. 897.

P. tacamahacca Miller. *P. balsamifera* DuRoi, not L. See Jour. Arn. Arb. **10**: 55 (1929). Common on flood plains along creeks and rivers. Miller House, no. 114; on the banks of the Koyukuk, Wiseman, no. 896.

Salix reticulata L. One of the most common prostrate willows in the hills of the Interior. Park, nos. 115, 595; Rapids, no. 116; Wiseman, no. 903. The two latter belong to var. orbicularis (Anders.) Floderus.

S. arctica Pallas. *S. crassijulis* Trautv. Common in alpine regions. Park, nos. 118, 594 (Savage River Camp), 600; Paxson, no. 119.

S. rotundifolia Trautv. Eagle Summit, no. 735.

This small willow with bright green, round leaves and short pistillate catkins is rare in the mountains.

S. phlebophylla Anders. Growing in mats on bleak, bare mountain summits. Porcupine Dome, no. 736.

The stems of this species are crowded with skeletonized leaves.

S. pseudopolaris Floderus. Rare. Eagle Summit, no. 117.

S. stolonifera Coville. Eagle Summit, nos. 120, 737.

A low-growing willow of alpine regions, characterized by many stolons.

S. niphoclada Rydb. Frequent along the Richardson Highway on the banks of glacial streams. Paxson, no. 121; Rapids, no. 1039; Fairbanks, no. 1084; Wiseman, no. 904.

These specimens seem to belong to the general complex of *S. brachycarpa* Nutt. and *S. niphoclada* Rydb. The leaves tend to become gray or spotted when dry, are rounded at the base, on short petioles.

S. GLAUCA L. A circumpolar willow which varies widely. The Alaskan-Yukon Valley representative was named *S. Seemanii* by Rydberg. Miller House, nos. 123, 733.

S. GLAUCA L., var. ACUTIFOLIA Schn. See Bot. Gaz. **66**: 327 (1918), and **67**: 60 (1919); RHODORA **33**: 241–4 (1931). Very common along streams. Paxson, no. 124; Rapids, no. 1038; Circle Springs, no. 125; Miller House, no. 126; Ft. Yukon, no. 128; Wiseman, no. 899.

S. BARCLAYI Anders. Paxson, no. 129.

S. ALAXENSIS (Anders.) Cov., var. LONGISTYLIS (Rydb.) Schn. The felt-leaf willow is a characteristic common tree of valleys of the Interior. Park, no. 597; Miller House, nos. 130, 732; Wiseman, no. 901.

S. BEBBIANA Sarg. *S. rostrata* Richards. A shrub or small tree common in woods and along the banks of creeks and sloughs. Park, no. 593; Circle Springs, no. 131; Fairbanks, no. 1083.

S. ARBUSCULOIDES Anders. Occasional. Park, no. 599; Miller House, no. 734.

S. PULCHRA Cham. Apparently rather rare in the Interior. Park, no. 598.

MYRICA GALE L. Rare in this region. Along the Yukon River, no. 133.

BETULA PAPYRIFERA Marsh. The common white birch of the Interior forests. Abundant and widespread. Miller House, no. 738; along the Yukon River, no. 134; Wiseman, no. 905.

B. GLANDULOSA Michx. A vast portion of the tundra is covered by this dwarf birch. Miller House, nos. 135, 739; Wiseman, no. 906.

B. GLANDULOSA Michx., var. SIBIRICA (Ledeb.) Blake. Park, no. 136; Wiseman, no. 907.

B. ERMANI × GLANDULOSA. Park, no. 601.

ALNUS CRISPA (Ait.) Pursh. *A. fruticosa* Rupr. Abundant along the edges of creeks and streams. Rapids, no. 1037; Wiseman, no. 908.

A. SINUATA Rydb. Along river banks, near Fort Yukon, no. 137.

GEOCAULON LIVIDUM (Richards.) Fernald in RHODORA **30**: 21–24 (1928). *Comandra livida* Richards. Common in sterile soil on hillsides, often associated with *Pedicularis labradorica*. Rapids, nos. 141, 1015; Circle Springs, no. 140; Wiseman, no. 909.

The leaves are frequently variegated.

RUMEX MEXICANUS Meisn. Along Yukon River, no. 142; Miller House, no. 740.

R. ARCTICUS Trautv. In bogs, Wiseman, no. 910.

R. ACETOSA L. On stony slopes, near Savage Camp, Park, no. 602.

OXYRIA DIGYNA (L.) Hill. Common in damp rocky crevices in the

mountains. Rapids, nos. 144, 1042; Park, no. 603; Eagle Summit, nos. 143, 741.

Polygonum aviculare L. Wiseman, no. 911.

P. viviparum L. Abundant throughout the alpine tundra. Park, no. 149; Eagle Summit, nos. 150, 744; Wiseman, no. 912.

P. Bistorta L. *P. plumosum* Small. Scattered over the tundra, this plant from Asia with plumy rose-pink spikes, occurs less frequently than the preceding circumpolar, bulb-bearing species. Park, no. 147; Miller House, no. 743; Eagle Summit, no. 148, 745.

P. alpinum All., var. lapathifolium Cham. & Schlecht. A tall, conspicuous plant, very common in thickets along roadsides and in gravelly places. Miller House, no. 746; Circle Springs, no. 151.

It is called "Wild Rhubarb," and, when young and tender, is sometimes used for greens.

P. hydropiperoides Michx. Circle Springs, no. 152.

P. Convolvulus L. Occasional. Fairbanks, no. 1074; Circle Springs, no. 153.

Chenopodium capitatum (L.) Asch. *Blitum capitatum* L. Common around cabins and in vacant lots. Fairbanks, nos. 154, 1076.

C. album L. A common weed. Fairbanks, no. 1077.

Claytonia sarmentosa C. A. Meyer. *Montia sarmentosa* Robinson. Large clumps of this delicate, pink *Claytonia* grew in wet, springy spots at the base of Eagle Summit, nos. 156, 747. A small specimen (in bloom) was brought to me by an Eskimo in Wiseman, no. 914.

C. tuberosa Pall. Occasional with the preceding at the base of the Summit, no. 748.

The large tubers of this white-flowered plant are eaten by Eskimos and Indians. Both these Claytonias have been considered endemic to the North Pacific or to the Bering Sea region.

C. Scammaniana Hultén in Botaniska Notiser **4**: 826–827, fig. 1 (1939). Porcupine Dome, July 12, 1937, no. 749.

A few plants of this brilliant purplish-magenta Claytonia made a vivid patch of color at the base of a melting snowbank on the lower slopes of the Dome. I saw it only in this one spot throughout the region. It is very characteristic in appearance, low in growth, single-flowered, with long, narrow basal leaves.

Stellaria calycantha (Ledeb.) Bong., var. isophylla Fernald. Not common. Miller House, no. 750-A.

S. calycantha (Ledeb.) Bong., var. floribunda Fernald. Miller House, no. 752.

S. crassifolia Ehrh. *Alsine crassifolia* (Ehrh.) Britton. Occasional in sloughs. Fairbanks, no. 862.

S. LONGIPES Goldie. *Alsine longipes* (Goldie) Cov. Common throughout the region. Very variable. Park, no. 611; Eagle Summit, no. 750; Circle Springs, no. 159. A glaucous form with stiffer leaves described as var. LAETA (Richards.) Wats. Rapids, nos. 160, 1008; Miller House, no. 751.

S. LONGIFOLIA Muhl. *Alsine longifolia* (Muhl.) Britton. Miller House, no. 752-a.

S. MEDIA (L.) Cyrill. Introduced. Fairbanks, no. 158; Wiseman, no. 920.

CERASTIUM VISCOSUM L. Introduced. Wiseman, no. 919.

C. BEERINGIANUM Cham. & Schlecht. Very common throughout the region. Park, no. 607; Fairbanks, no. 1055; Miller House, no. 753; Eagle Summit, no. 163.

C. BEERINGIANUM Cham. & Schlecht., var. GRANDIFLORUM (Fenzl) Hult. Fl. Aleut. Isl. 165 (1937). This larger variety, with petals much longer than the green sepals and acute leaves, is not as common. In wet places. Rapids, nos. 162, 1009; Eagle Camp, no. 698.

SPERGULARIA RUBRA (L.) J. & C. Presl. Probably introduced. Fairbanks, no. 1067.

ARENARIA LATERIFLORA L. *Moehringia lateriflora* (L.) Fenzl. Not very common, but widely distributed in woods and thickets. Curry, no. 571; Miller House, no. 760; Circle Springs, no. 164.

A. PHYSODES DC. *Merckia physodes* Fisch. This North Pacific species seems to be very plentiful wherever it is found in this region. In gravel and mining debris at Miller House, no. 755; Circle Springs, no. 166; Wiseman, no. 915.

A. DAWSONENSIS Britton. Rare. Along road at the base of Eagle Summit, no. 167; Wiseman, no. 918.

A. RUBELLA (Wahlenb.) Sm. On stony ground. Park, no. 610; Rapids, nos. 169, 1007.

A. ROSSII R. Br. On damp slopes. Conspicuous for its reddish-purple sepals. Miller House, no. 168; Eagle Summit, no. 756.

A. OBTUSILOBA (Rydb.) Fernald in RHODORA **21**: 12–15 (1919). Park, no. 609; Rapids, no. 170; in great clumps on dry cliffs and ledges back of Miller House, no. 759.

A. ARCTICA Steven. *Minuartia arctica* (Steven) Aschers. & Graebn. Park, no. 173; Eagle Summit, nos. 174, 758.

A. MACROCARPA Pursh. *Minuartia macrocarpa* (Pursh) Ostenf. Park, no. 171; Eagle Camp, no. 697; Eagle Summit, nos. 172, 757.

Both this species and the preceding were very abundant on the mountains in the Park and the Eagle Summit region. They are sometimes confused, if not found in fruit. See Hultén, Fl. Kamtch. **2**: 79–81 (1928) for descriptions of the two species. The stems of *A. macrocarpa* are matted-cespitose instead of tufted; the lower leaves are denticulate and falcate; the stem-leaves are connate-clasping and

very glandular; the sepals and petals are longer than and of different shape from those of *A. arctica;* the flat filaments widen more gradually to the dilated base.

Silene acaulis L., var. exscapa (All.) DC. This arctic species forms large cushions in the mountains of the Interior. Abundant in gravelly places along the Savage River. Park, no. 605; Eagle Summit, nos. 175, 761.

S. acaulis L., var. subacaulescens (F. N. Williams) Fern. & St. John in Rhodora **23**: 119–120 (1921). This western cordilleran variety is rare in the Interior of Alaska. It was found only in the Park, nos. 176, 606.

S. repens Patrin. Occasional on exposed slopes at altitudes of about 2000 feet in places where one finds *Pedicularis labradorica, Arnica attenuata* and often *Dryopteris fragrans.* Miller House, nos. 177, 762; on road between Miller House and Eagle Summit, no. 178.

S. Williamsii Britt. in Bull. N. Y. Bot. Gard. **2**: 168 (1901); see Porsild in Rhodora **40**: 212 (1938). In dry places on the banks of the Chena River, Fairbanks, nos. 179, 1056.

Lychnis Tayloriae Robinson in Proc. Amer. Acad. **28**: 150 (1893). See Rhodora **34**: 22–25 (1932). Occasional in alpine regions. Eagle Camp, nos. 699, 764.

L. apetala L. *Melandrium apetalum* (L.) Fenzl. Seen only at the base of the higher summits. Eagle Summit, no. 180; Porcupine Dome, no. 763.

Nuphar variegatum Engelm. *Nymphozanthus variegatus* (Engelm.) Fernald. Observed commonly in ponds and small lakes in the lower regions of the Interior.

Caltha natans Pall. This small white-flowered *Caltha* is probably rare in the Interior. Collected only once in a wet, boggy area with *Ranunculus Purshii*, subsp. *yukonensis,* Circle Springs, no. 181.

It has an interesting distribution from northern Mongolia and Kamtchatka, in the Bering Sea region, with isolated stations in Alberta, Athabasca, and northern Minnesota.

C. palustris L., var. asarifolia (DC.) Huth. Very common in southwestern Alaska and observed in ditches along the R. R. tracks from McKinley Park to Fairbanks. Collected it at Seward, but neglected to get specimens from the Interior. Probably common in the lowlands.

Actaea rubra (Ait.) Willd. *A. spicata* L., var. *rubra* Ait. Apparently very rare in the central and northern Interior. Circle Springs, no. 183. Plants with white berries (forma neglecta (Gillman) Robinson—*A. eburnea* Rydb.) as well as red grew tall and luxuriantly in thickets and thin woods in the neighborhood of the Hot Springs. Both specimens in fruit. Circle Springs, no. 184.

Delphinium Menziesii DC. Frequent in the mountains of the Interior. Eagle Summit, nos. 186, 765; on the way to Porcupine Dome, no. 766.

D. scopulorum Gray, var. glaucum Gray. *D. Brownii* Rydb. A tall plant often four or five feet high. Collected in two places only, but it appeared to be common in thin woods in lower regions. Rapids, no. 1014; Fairbanks, no. 185.

Aconitum delphinifolium DC. Widespread and common throughout the Interior, in thickets on hills and slopes of mountains. Rapids, nos. 188, 1013; Circle Springs, no. 187; Eagle Summit, no. 771; Wiseman, no. 922.

Anemone patens L., var. Wolfgangiana (Bess.) Koch. *Pulsatilla ludoviciana* (Nutt.) Heller. My specimen from the Park, no. 613, was in fruit, but a beautifully pressed flower was given me by a young girl in Fairbanks.

A well-known and beloved wild flower of the Interior, called generally "Wild Crocus." The very large purple blossom comes very early in the spring as soon as the snow melts.

A. parviflora Michx. One of the earliest flowers to bloom at Savage River Camp, in the Park, about the middle of June, no. 616. In Wiseman, no. 923, I collected both flowers and fruit the first week in August. Other collections were made at Rapids, no. 191, and on the road below Eagle Summit, no. 190.

A very common *Anemone* of wide-spread distribution. The backs of the sepals are usually tinged pink or blue.

A. parviflora, var. grandiflora Ulbr. in Engl. Bot. Jahrb. **37**: 251 (1905). Park, nos. 189, 617.

This variety, with the large flowers nearly two inches in diameter, was the most abundant at Savage River Camp. It seemed quite distinct, the sepals in my specimens lacking the bluish tinge.

A. multifida Poir., var. hudsoniana DC. *A. globosa* Nutt. See Rhodora **19**: 141 (1917). Occasional in gravelly places. Rapids, no. 192.

A. narcissiflora L. *A. zephyra* A. Nels. One of the most beautiful of the Alaskan wild flowers, growing sometimes in large masses, in dry, rocky soil in the mountains of the Interior. General throughout the territory. Park, nos. 614, 615; Eagle Summit, nos. 195, 767. Often the plants of higher altitudes where there is little soil are single-flowered, described by Eastwood as var. uniflora.

A. Richardsonii Hook. This low-growing bright yellow Anemone prefers moist, springy ground. Common along the southwestern coast, and also in the Bering Sea region, but occasional in the Yukon Valley. Park, no. 612.

Ranunculus Purshii Richards., ssp. yukonensis (Britt.) Porsild. *R. yukonensis* Britt. in Bull. N. Y. Bot. Gard. **2**: 168 (1901). Occasional along edges of ponds. On the mud of a dried-out swamp. Both flowers and leaves very small. Circle Springs, no. 198.

R. hyperboreus Rottb. In wet places. Paxson, no. 199.

R. nivalis L. Park, no. 618; Eagle Summit, nos. 200, 769.

True to its name this bright yellow buttercup is found often abundantly just below melting ice or snow patches in the mountains. A characteristic field mark is the brown- or black-hairy calyx.

R. pygmaeus Wahlenb. A small arctic-alpine plant, very rare in the mountains of the central Interior. Seen only on Eagle Summit, nos. 201, 770.

R. sceleratus L. In ditches near Ester Creek, Fairbanks, no. 202.

Thalictrum sparsiflorum Turcz. In ditches along wooden sidewalks in Fairbanks, no. 210.

Papaver alaskanum Hultén, Fl. Aleut. Isl. 190, tab. 10 (1937). Park, no. 619.

In bloom the middle of June on a sunny exposed spot where the snow had just melted. These were low-growing plants with many old petioles, deeply dissected grayish-green leaves, well covered with stiff hairs, and pale yellow flowers with the central projection of the stigma absent.

P. microcarpum DC. A tall, slender, large-flowered, deep yellow poppy, frequent in the hills. Eagle Summit, no. 772; Wiseman, no. 968.

One plant only, very unusual and distinctive, with white petals, bordered by a wide pink band, and with dark green leaves, was collected at Eagle Summit, no. 212.

Corydalis pauciflora (Steph.) Pers. A low plant with several large pinkish-lavender spurred flowers, apparently common in the alpine meadows of the Park, no. 620, but rather rare elsewhere in the Interior. It grew also at Eagle Summit (field notes).

C. sempervirens (L.) Pers. Apparently rare. On a rocky slope behind the R. R. station. Park, no. 213.

Eutrema Edwardsii R. Br. Collected only near top of Eagle Summit, no. 774.

This circumpolar, arctic species, known usually from the northern coast and the Bering Sea region is rare in the higher mountains of the Interior. See Fernald in Mem. Gray Herb. **2**: 337 (1925), for map of general distribution.

Brassica campestris L. Introduced. Miller House, no. 218.

Rorippa barbareaefolia (DC.) Kitagawa in Journ. Jap. Bot. **13**: 137 (1937). In damp places near the mines. Miller House, no. 777.

R. curvisiliqua (Hook.) Bess. Occasional. Park, no. 223; Rapids, no. 224.

Barbarea ? planisiliqua C. A. Meyer. Not well developed. Curry, no. 569.

Cardamine pratensis L. Not common in the Interior. In damp thicket beside the Savage River, Park, no. 629; Wiseman, no. 1188.

C. pratensis, var. angustifolia Hook. Park, no. 628.

C. purpurea Cham. & Schlecht. This beautiful little arctic plant of Siberia and Alaska grows in masses in moist alpine situations in the mountains of the Interior. Park, no. 627, (white-flowered form) no. 626; Eagle Summit, nos. 226, 779.

C. bellidifolia L. Rare in the mountains. Eagle Summit, nos. 227, 780.

C. bellidifolia L., var. beringensis A. E. Porsild in Trans. Royal Soc. of Can. ser. 3, sect. 5, **32**: 31 (1938). This sturdy, vigorous variety with broader and shorter siliques was collected in damp ground on lower slopes of Eagle Summit, no. 781 (listed by Porsild in Rhodora **41**: 234 (1939).

All previous collections are from the islands and nearby shores of Bering Sea. New to the Interior of Alaska.

Lesquerella arctica (Wormskj.) Wats., var. Scammanae Rollins in Am. Journ. Bot. **26**: 421 (1939). A new variety of *L. arctica*, taller in growth, with long slender pedicels and leaves, grew abundantly on a dry, gravelly bank near Gunnysack Creek. It was collected both years in the same place, but not seen elsewhere. *L. arctica* is rare in Alaska, as, with the exception of specimens from the Bering Sea region, it has been reported only from the head of the Chitina River. The type of the new variety is no. 216, Rapids, Aug. 7–10, 1936. The second collection, Rapids, no. 1000.

Thlaspi arvense L. In waste grounds around roadhouses and cabins. Introduced. Rapids, nos. 217, 1002; Fairbanks, no. 863.

Lepidium apetalum Willd. Fairbanks, no. 864.

Neslia paniculata (L.) Desv. Introduced. Fairbanks, no. 1069.

Capsella Bursa-pastoris (L.) Medic. Observed in several places about settlements, but failed to collect it.

Draba alpina L. Seen only once. Park, no. 625. Rare.

Dr. nivalis Lilj. Delicate, tufted, in dry gravels near Savage River. Park, no. 621.

Dr. praealta Greene. A Rocky Mountain species. Park, nos. 214-B and 622.

Dr. glabella Pursh. See Fernald in Rhodora **36**: 333 (1934). Common in alpine situations in Interior. Park, no. 214-A; Rapids, no. 215.

Dr. borealis DC. An Asiatic-Northern Pacific species. Park, no. 623-A.

Descurainia sophioides (Fisch.) O. E. Schulz in Engler, Pflanzenr. **4**: 105: 316 (1924). Common and abundant in settlements and mining districts. Park, no. 632; Miller House, no. 776; Wiseman, no. 926.

Arabis lyrata L., var. kamchatica Fisch. Very common at Seward and along the coast where it was one of the first plants to bloom in the spring, but not seen as often in the Interior. Rapids, nos. 229, 1001.

A. lyrata L., var. glabra (DC.) Hopkins in Rhodora **39**: 93–94 (1937). In dry stony places. Park, no. 630; Rapids, no. 228.

A. divaricarpa A. Nelson. Probably rare in Alaska in dry sandy places. Along R. R. track from Anchorage to Curry, no. 568; Park, no. 633.

Erysimum cheiranthoides L. Very common and of widespread distribution in the central Interior. Probably introduced. Fairbanks, no. 221; Miller House, no. 775; Circle Springs, no. 220; along Yukon River, no. 222; Wiseman, no. 925.

Parrya nudicaulis (L.) Regel. *P. macrocarpa* R. Br. In open woods in the Park, no. 631; Eagle Summit, nos. 225, 778.

A showy plant with large flowers varying from white and pink to lavender and purple. It is popularly called "Wild Stock" in Alaska and is fairly common in Alpine regions in moist tundra. There is considerable variation in the leaves and in the degree of glandular pubescence.

Sedum roseum (L.) Scop., var. integrifolium (Raf.) Hultén, Fl. Aleut. Isl. 205 (1937). *Rhodiola integrifolia* Raf. See also Porsild in Rhodora **41**: 239–240 (1939). Common throughout the Territory in moist mossy crevices. Park, no. 230; Circle Springs, no. 231. Also seen at Eagle Summit, no. 783.

Boykinia Richardsonii (Hook.) Gray. This tall conspicuous plant is seen occasionally in damp open ground in subalpine regions. Park, no. 233; Wiseman (in fruit), no. 928.

Saxifraga rivularis L. In wet mossy crevices in the mountains. Rapids, no. 235 (in fruit); Eagle Summit, nos. 234-A, 784.

S. adscendens L. One specimen resembles closely this cordilleran species. Very rare in Alaska. Eagle Summit, no. 234-B.

S. foliolosa R. Br. *S. stellaris* L., var. *comosa* Retz. Most of the flowers on the delicate stem are replaced by tiny tufts of green leaves. In wet ground beside a small ditch. Eagle Summit, no. 791.

Probably new to the flora of the Interior.

S. hieracifolia Waldst. & Kit. Occasional in alpine tundra. Park, no. 638; Circle Springs, no. 236; Eagle Summit, no. 785.

S. reflexa Hook. Fl. Bor.-Am. **1**: 249, tab. 85 (1840). *S. yukonensis* Small. On a gravelly bank, Park, no. 637.

Apparently rare, as it has been recorded in two other stations only in the Interior.

S. PUNCTATA L. sens. lat. Common on moist ledges in the Eagle Summit region, nos. 237, 238, 786; almost at the very top of Porcupine Dome, no. 787.

This group is very variable. See Hultén, Fl. Aleut. Isl. 213–214 (1937) and Sv. Bot. Tidskr. 30, 3: 324, fig. 5 (1936). Most of my specimens have the inflorescence more open, dark purple capsules and purplish-tinged leaves and scape, as in ssp. *insularis* Hultén.

S. TRICUSPIDATA Rottb. Common on dry ledges in all the subalpine regions where I collected. Sometimes forming large mats over rocks, and readily separated from the next species by the rigid leaves with three sharp teeth. Park, nos. 239, 636; Rapids, no. 1003; Miller House, no. 788; Wiseman, no. 929.

S. BRONCHIALIS L. ssp. FUNSTONII (Small) Hult. Fl. Kamtch. **3**: 12–17 (1929). Fairly common also in stony places. Park, no. 636-A; Eagle Summit, nos. 240, 789; Wiseman, no. 930.

S. ESCHSCHOLTZII Sternb. Rapids, no. 1041.

This dwarf cespitose *Saxifraga* of Asiatic-Western American distribution is rarely found. Probably the second record for the Interior.

S. FLAGELLARIS Willd. Occasional in the mountains of the Interior. In a swampy meadow in Park, nos. 241, 635; Wiseman, no. 931.

The specimens in the two collections differ considerably. No. 931 has a much larger single flower with very long flagella.

S. HIRCULUS L. Park, no. 242; Eagle Summit, nos. 243, 790.

A common and beautiful Saxifrage, with large bright yellow flowers, the petals usually red-spotted, growing in wet boggy places in the mountains.

S. OPPOSITIFOLIA L. This well-known circumpolar species seemed to be surprisingly rare in the central Interior. Park, no. 634.

PARNASSIA PALUSTRIS L., var. NEOGAEA Fernald in RHODORA **39**: 310–312 (1937). Common and abundant throughout the region, except in the higher altitudes. Park, no. 247; Rapids, no. 1004; Big Delta, no. 250; Fairbanks, no. 1070 (a freak form); Miller House, no. 793; Circle Springs, no. 249; Wiseman, nos. 248, 932.

Prof. Fernald has described in detail, with plates, the differences between the American plant and the head form. Several of my specimens, especially those from Wiseman, seem to show transitional forms between the variety and the typical form of the species.

P. KOTZEBUEI Cham. & Schlecht. Found often in damp thickets in sub-alpine regions. Miller House, no. 792; Eagle Mining Camp, no. 695; Circle Springs, no. 251; Wiseman, no. 1189.

RIBES TRISTE Pall. Occasional. Wiseman, no. 927.

Spiraea Beauverdiana Schneid. See Hultén, Fl. Kamtch. **3**: 38–41 (1929). *S. betulifolia* Am. auth., non Pall.; *S. Stevenii* (Schneid.) Rydb. Very common along roadsides, in thickets, and dry tundra throughout. Miller House, no. 794; Circle Springs, no. 253; Wiseman, no. 933.

Rubus idaeus L., var. canadensis Richardson. A delicious wild raspberry common in thickets of the Interior. Miller House, no. 796; Circle Springs, no. 254.

R. Chamaemorus L. The Cloudberry or Baked-apple Berry is abundant in moist tundra and peat bogs throughout. Park, no. 640; Miller House, no. 795; Circle Springs, no. 255; Wiseman, no. 934.

R. acaulis Michx. In moist ground near Savage River. Park, no. 639.

R. arcticus L. Wiseman, nos. 935, 935-A.

The specimens from Wiseman seem to belong here, although *R. arcticus* and *R. acaulis* are confusing and critical in Alaska. Stems leafy, calyx-lobes densely pubescent, petals obovate and less clawed.

Fragaria yukonensis Rydb. A small-fruited strawberry with long runners, common on banks of sloughs. Fairbanks, no. 1072.

Potentilla norvegica L. Common in low ground. Miller House, no. 798; Fairbanks, no. 260; Wiseman, no. 937.

P. nivea L. See Hultén, Fl. Kamtch. **3**: 68–69 (1929) for discussion of this and *P. uniflora*. Occasional. Park, no. 642; Rapids, no. 261.

P. uniflora Ledeb. On bare rocky places in the mountains. Not common. Park, no. 641; Wiseman, no. 936.

P. pensylvanica L. Sandy banks of rivers. Rapids, nos. 262, 1010; Eagle on the Yukon, no. 263.

P. Nuttallii Lehm. Eagle, no. 264; Along Yukon River, no. 265.

P. gracilis Dougl. New to interior of Alaska. Wiseman, no. 938.

P. biflora Willd. On the slopes of Porcupine Dome, no. 800.

A tufted alpine Potentilla, very characteristic, with thick woody caudex, leaves with linear divisions, calyx-lobes and bractlets of a reddish tinge, as is also the stem, and pale yellow petals. According to Wolf it has a wide range from the Himalayas and mountains of Central Asia to arctic regions of eastern Asia and Western N. A., but is nowhere common. It has been collected at Cape Thompson, and several places on the Seward Peninsula, but this, a far inland station, is the first record for the Interior.

P. elegans Cham. & Schlecht. in Linnaea **2**: 22 (1827); Ledeb. Fl. Ross. **2**: 56; Lehmann, Rev. Potentill. 53, fig. 1 (1856); Wolf, Monogr. Gatt. Potentilla, 532 (1908). Amid rock fragments on the bare, wind-swept top of Porcupine Dome, no. 801 (flowers and fruit). The first record for Interior Alaska, and the second for the North American continent.

The finding of this dainty, low, tufted Asiatic Potentilla, with caudex crowded with persisting brown stipules, three-foliolate leaves, hairy calyx, and pale yellow petals, a little longer than the sepals, was a happy experience of the summer. At home in the mountains of Siberia and north-western Mongolia, it was collected once before by Thornton, in the Sawtooth Range on Seward Peninsula, and reported by Porsild, RHODORA **41**: 246 (1939). Its closest relative is *P. Robbinsiana* Oakes, a rare endemic of the White Mountains, N. H.

P. EGEDII Wormsk., var. GROENLANDICA (Tratt.) Polunin in RHODORA **41**: 40 (1939). *P. pacifica* Howell. Very common along the Yukon River, nos. 270, 271 (very silvery hairy); Rampart, no. 269.

P. PALUSTRIS (L.) Scop. *Comarum palustre* L. In wet places, Paxson, no. 267.

P. FRUTICOSA L. This shrubby Potentilla, known in the Interior as "Tundra Rose," is one of the most abundant and characteristic plants in the region. In lowlands, beside roads, in dry tundra, and in subalpine locations. Fairbanks, no. 1071; Miller House, no. 799; Wiseman, no. 268. Also common in Park (field notes).

GEUM MACROPHYLLUM Willd., var. PERINCISUM (Rydb.) Raup in RHODORA **33**: 172–176 (1931). Common around settlements. Fairbanks, no. 275; Circle Springs, no. 274.

G. ROSSII (R. Br.) Sér. *Sieversia Rossii* R. Br. A beautiful plant, abundant in wet, springy ground, in the higher mountains; often below snow patches. Eastern Asiatic-Western American. Park, no. 643; Eagle Summit, no. 802-A; slopes of Porcupine Dome, no. 802.

SANGUISORBA OFFICINALIS L. *S. microcephala* Presl, according to Rydb. in N. Am. Fl. **22**[4]: 387 (1908). Along the banks of rivers. Tanana, no. 285.

Both Hultén and Porsild think the American plant should not be separated.

S. SITCHENSIS C. A. Meyer. Not seen north of the Alaska Range. Beside a brook in the woods above Rapids, nos. 284, 1011.

S. ? MENZIESII Rydb. Form with oblong spikes and purple calyx. In same places as above. Rapids, nos. 286 and 1011-A.

DRYAS DRUMMONDII Richards. Occasional in gravel bars along rivers. Park, no. 277. Abundant in large mats along the paths of the village, mostly with the striking feathery akenes, as it was in August, but several with the low-stemmed nodding yellow flowers. Wiseman, nos. 278, 941.

DR. OCTOPETALA L. Very common in dry, stony places in the mountains. Growing so closely in thick mats that the ground looks as though covered by snow patches. Park, no. 645; Rapids, nos. 282, 1012; Eagle Summit, nos. 281, 803.

DR. INTEGRIFOLIA M. Vahl. Not as frequent as the preceding species. In gravels in the mountains. Park, nos. 279, 644.

Dr. integrifolia M. Vahl, var. sylvatica Hultén in Sv. Bot. Tidskr. **30**, 3: 527, fig. 2a (1936). Below Ft. Yukon on wooded bank, no. 280; Wiseman, in woods, no. 940.

Rosa acicularis Lindl. Very common everywhere except in the high mountains. Fairbanks, nos. 287, 1057; along Yukon River, no. 288; Wiseman, no. 942. Also at Miller House, but did not collect it there.

The beautiful wild rose of Alaska, with very prickly stems, pyriform fruit, and large fragrant flowers.

Trifolium pratense L. Introduced. Fairbanks, no. 1079.

T. hybridum L. Introduced. Fairbanks, no. 1078.

Medicago lupulina L. Miller House, no. 811.

Lupinus arcticus Wats. Common on dry sandy slopes throughout the region. In open woods in the Park, nos. 289, 646; Circle Springs, no. 290.

Astragalus frigidus (L.) Gray, var. littoralis (Hook.) Wats. Occasional in subalpine locations. Park, no. 649; Miller House, nos. 293, 804.

A. alpinus L. Generally common. Park, no. 648; Rapids, no. 292; Fairbanks, no. 690; Wiseman, no. 943.

A. yukonis Jones, Revision of N. A. Astragalus, p. 89 (1923). Tanana, along the Yukon River, no. 294. Possibly the first record for Alaska.

This weak-stemmed, much branched *Astragalus*, with flowers capitate in bloom and pods ascending, is very rare in herbaria. It was described from specimens found by Gorman near Ft. Selkirk, Yukon Territory. Later collected by Eastwood at Whitehorse, and recently by Raup on the Athabaska.

A. falciferus Hult. *Gynophoraria falcata* Rydb. See Hultén in Sv. Bot. Tidskr. **30**, 3: 526. Rare. On rock pile near Sable Pass, Park, no. 647.

Second report for Alaska.

Oxytropis Maydelliana Trautv. *O. campestris* DC., var. *melanocephala* Hook. Rare in the high mountains of the Interior. Eagle Summit, no. 805; on way down from Porcupine Dome, no. 805-A.

Characterized by chestnut-colored stipules.

O. Mertensiana Turcz. Porcupine Dome, no. 809.

A distinctive eastern Asiatic species, very rare in the Interior, probably the first station, but reported previously twice from Seward Peninsula. The third record for Alaska.

O. arctica R. Br. Eagle Summit, no. 806; Porcupine Dome, no. 807.

O. PYGMAEA (Pall.) Fernald in RHODORA **30**: 153 (1928). Occasional in the mountains. Park, no. 650; Eagle Summit, no. 808.

O. HUDSONICA (Greene) Fernald. Near Polychrome Pass, Park, no. 651.

A plant with a strong tap-root, leaflets 18 or more, usually attenuate, and very glandular calyx.

O. GRACILIS (A. Nels.) K. Schum. Fairly common. Park, no. 295; Rapids, no. 296; Wiseman (in fruit), no. 945.

O. DEFLEXA (Pall.) DC. Wiseman, no. 944.

This specimen has truncate calyx-tubes, with broad, rectangular sinuses between short teeth. It is, therefore, the true Siberian *O. deflexa*, not *O. retrorsa* Fernald, the American plant which formerly passed in America as *O. deflexa*. See RHODORA **30**: 140 (1928). *O. retrorsa* has lanceolate, approximate calyx-lobes and acute sinuses. Second record for Alaska.

HEDYSARUM ALPINUM L., var. AMERICANUM Michx. A variable species, very common along sloughs and creeks throughout the Interior. Park, nos. 304, 653; Rapids, nos. 302, 1018; Fairbanks, nos. 301, 689; Miller House, no. 810; Circle Springs, no. 300; along Yukon River, no. 303; Wiseman, no. 947.

H. MACKENZII Richards. Occasional in thickets along rivers and streams. Rapids, no. 1017; Wiseman, nos. 306, 946.

GERANIUM ERIANTHUM DC. Not seen north of the Alaska Range. Curry, no. 566.

LINUM LEWISII Pursh. Fairbanks, no. 865.

EMPETRUM NIGRUM L. The Crowberry is abundant in heaths and bogs, especially in subalpine regions. Park, no. 308; Rapids, no. 1022; Miller House, no. 812; Circle Springs, no. 309; Wiseman, nos. 310, 948.

VIOLA BIFLORA L. The Violas are among the rarest plants of the Interior. This yellow-flowered species was collected but once, in a willow thicket on a slope back of the ranger cabin at Igloo, Park, no. 654.

V. ? PALUSTRIS L. In swamps, Circle Springs, no. 312; Fox near Fairbanks, no. 313.

Not sufficient material to be sure of this. Collected *V. epipsila* Ledeb. in Seward on the southwestern coast, but did not see it in the Interior.

SHEPHERDIA CANADENSIS (L.) Nutt. The "Soap berry" is common in open woods and thickets along streams. Park (in bloom), no. 655; Fairbanks, no. 315; Circle Springs, no. 314; Wiseman, no. 949.

CIRCAEA ALPINA L. Circle Hot Springs, no. 327.

Apparently the second record from the Interior. Porsild reports it from Tanana Hot Springs, in RHODORA **41**: 263 (1939).

Epilobium angustifolium L. *Chamaenerion angustifolium* (L.) Scop. The Fire-weed is, doubtless, the most spectacular plant in Alaska, covering entire hills and meadows with a rose-magenta blanket. It also fringes both the Richardson and Steese Highways. Paxson, no. 316; Fairbanks, no. 1060; Wiseman, no. 950.

E. angustifolium, forma albiflorum (Dumort.) Haussk. Occasional. Wiseman, no. 318.

E. angustifolium, forma spectabile (Simmons) Fern. Miller House, no. 813.

E. latifolium L. *Chamaenerion latifolium* (L.) Sweet. The large-flowered "River Beauty," as it is sometimes called in Alaska, is often found on gravel bars in rivers and creeks in subalpine regions. For map of general distribution see Fernald in Mem. Gray Herb. **2**: 337 (1925). Park, no. 320; Miller House, no. 814; Wiseman, nos. 321, 951, (a pale pink form) no. 952.

E. latifolium L., var. kamtschaticum Haussk. Park, no. 323; Wiseman, no. 953.

E. palustre L. In wet ground by a creek. Miller House, no. 815.

E. glandulosum Lehm. A northern station for this species. Circle Hot Springs, no. 324.

Bupleurum americanum Coult. & Rose. Common in dry gravels. Park, no. 329; along Yukon River, no. 330; Wiseman, no. 954.

Conioselinum cnidiifolium (Turcz.) Porsild in Rhodora **41**: 267–268 (1939). *C. dawsoni* Coult. & Rose. On the bank of the Chena Slough, Fairbanks, no. 1081; along Yukon River, no. 333.

Heracleum lanatum Michx. This very tall, large plant grew in a woody thicket back of Gunnysack Creek, Rapids, no. 332.

Did not see it farther north.

Cornus canadensis L. Common in wooded areas, also in damp open places. Rapids, no. 1021; Fairbanks, nos. 337 and 691; Miller House, no. 335; Circle Springs, no. 334.

C. canadensis L., var. intermedia Farr. *C. unalaschkensis* Ledeb.; *C. canadensis* × *suecica* Hult. Fl. Aleut. 253–254 (1937). See also Porsild in Rhodora, **41**: 270 (1939). Occasional. Park, no. 656; near Donnelly Dome on Richardson Highway, no. 339; Circle Springs, no. 338.

C. stolonifera Michx., var. Baileyi (Coulter & Evans) Drescher. A common shrub in the Yukon Valley and central interior region. Fairbanks, no. 342; Circle Springs, no. 341.

Moneses uniflora (L.) Gray. In moist woods. Park, no. 344.

M. uniflora, var. reticulata (Nutt.) Blake. Rapids, nos. 345, 1020.

Pyrola secunda L. A wooded ravine, Wiseman, no. 956.

P. secunda L., var. obtusata Turcz. Rich woods, Rapids, no. 1019; Paxson, no. 349; Circle Springs, no. 348.

P. grandiflora Radius. Circle Springs, no. 351.

P. GRANDIFLORA, var. CANADENSIS (Andres) A. E. Porsild. Wiseman, no. 955-B.

P. GRANDIFLORA, var. GORMANII (Rydb.) A. E. Porsild. Common in open spruce woods near Savage River, Park, no. 657; Eagle Summit, no. 817. See Porsild, RHODORA, **41**: 271–273 (1939), for discussion of this species and varieties.

P. ASARIFOLIA Michx., var. INCARNATA (DC.) Fern. in RHODORA **6**: 178 (1904). Wiseman, no. 955–A.

LEDUM GROENLANDICUM Oeder. The Labrador Tea is very common in muskegs in the central Interior. Fairbanks, no. 355; Circle Springs, no. 354; Wiseman, no. 957.

L. PALUSTRE L., var. DECUMBENS Ait. *L. decumbens* (Ait.) Small. A dwarf, more northern species, with narrowly linear leaves, growing in the mountains. Park, no. 658; Eagle Summit, nos. 356, 820.

RHODODENDRON LAPPONICUM (L.) Wahlenb. Occasional on alpine slopes and also on the banks of the Savage River in the Park, no. 664.

LOISELEURIA PROCUMBENS (L.) Desv. The little "Alpine Azalea" is found occasionally on bare mountain slopes. Park, no. 659; Eagle Summit, no. 818; Circle Springs, no. 357.

CASSIOPE TETRAGONA (L.) D. Don. Very common and widespread on mossy ledges and alpine summits. Park, nos. 361, 660; Eagle Summit, no. 362; Wiseman, no. 958.

ANDROMEDA POLIFOLIA L. Common in peat bogs and tundra throughout. Fairbanks, no. 363; Eagle Summit, no. 819; Wiseman, no. 959.

CHAMAEDAPHNE CALYCULATA (L.) Moench. In low bogs. Fairbanks, no. 365; Circle Springs, no. 364; Wiseman, no. 960.

ARCTOSTAPHYLOS UVA-URSI (L.) Spreng. Bearberry or Kinnikinick is found now and then on dry bare slopes. Park, no. 661; Circle Springs, no. 366; Wiseman, no. 961.

A. RUBRA (Rehder & Wilson) Fernald. *A. alpina* (red-fruited form) of Richards. Very common in this region. Circle Springs, no. 367; Wiseman, no. 962.

The thin, deciduous leaves turn scarlet in the fall, causing the hills and lower mountain slopes of central Alaska to become masses of brilliant color.

VACCINIUM ULIGINOSUM L. The highly-prized blueberry of the Interior. Common in heaths and tundra. Fairbanks, no. 368; Wiseman, no. 963.

V. ULIGINOSUM L., var. ALPINUM Bigel. In alpine situations. Park, no. 662; Wiseman, no. 963-a.

V. VITIS-IDAEA L., var. MINUS Lodd. Common on dry slopes. Park, no. 663 (in flower); Circle Springs, no. 369; Wiseman, no. 964 (in fruit).

DIAPENSIA OBOVATA (Fr. Schmidt) Nakai in Nakai and Koidzumi, Trees and Shrubs of Japan proper, 194 (1922). *D. lapponica* L., var.

obovata Fr. Schmidt. Rather rare on mountain ledges. Top of Polychrome Pass, in Park, no. 665; rocky cliff above the Lodge, Rapids, no. 371; Eagle Summit, no. 821.

See Porsild in Trans. Royal Soc. of Can., ser. 3, sect. 5, **32**: 35 (1938), for discussion of *D. obovata* and *D. lapponica*. *D. obovata*, loosely caespitose with trailing branches, and of a reddish-green tinge, with short, thick styles is of Eastern Asiatic-Western American distribution, and all records west of the Mackenzie should be referred to it according to Porsild.

Douglasia Gormanii Constance in Am. Midland Naturalist, **19**: 257 (1938). A tiny caespitose plant with several rose-purplish flowers was found on a bare summit near Polychrome Pass in the Park, on June 20th, no. 675.

This very rare little plant I put with some hesitation here. The backs of the leaves are pubescent with forked hairs and the margins not definitely ciliolate, which corresponds to Constance's description. But specimens of this and *D. arctica* Hook. are so rare in herbaria that it is difficult to make determinations without more material. *D. arctica*, a rare arctic plant of the region west of the Mackenzie, is known in Alaska only by a sheet from Bering Strait. The type of *D. Gormanii*, and one other collection mentioned by Constance, are from Yukon River Valley and Lake Kluane in Yukon Territory respectively, so this is the first record for Alaska.

Androsace Chamaejasme Host, var. arctica R. Knuth. ?*A. Lehmanniana* Spreng. Occasional in sandy places. Near Savage River Camp, Park, no. 667.

A. septentrionalis L. *A. Gormanii* Greene. Rare. Dry cliff back of R.R. station in Park, no. 687.

Dodecatheon frigidum Cham. & Schlecht. A beautiful western-arctic "Shooting Star," common in wet, springy ground in high alpine regions of the Interior. Park, nos. 372, 666; Eagle Summit, nos. 373, 822.

Trientalis europaea L., var. arctica (Fisch.) Ledeb. Along the wooded bank of the river at Curry, nos. 572, 573.

No. 573 has narrow, acute leaves instead of broad and obtuse, and lanceolate petals. Also seen in a willow thicket in Fairbanks.

Gentiana propinqua Richards. See Hooker, Fl. Bor.-Am. **2**: 62, tab. 150 (1840). Twelve Mile, on Steese Highway, no. 377; Wiseman, nos. 376, 965.

These two collections are true *G. propinqua*, tall, but delicate stems, purplish, many branched, with a slender corolla, 10–15 mm. long, and generally short, very unequal calyx-lobes.

Other collections—Park, no. 375; Rapids, no. 1024; Miller House, no. 379; Circle Springs, no. 378—show much stouter plants with stem and leaves yellowish-green, cauline leaves more connate-clasping and calyx-lobes longer and united in a tube. Although they are different from typical *G. propinqua*, they can not be satisfactorily placed in any other species.

G. PROSTRATA Haenke. This low-growing, often almost prostrate Gentian with small blue flowers is found only occasionally in damp ground in the mountains. Park, no. 380; Rapids, no. 381.

G. GLAUCA Pall. A rare alpine plant with corolla of a strange shade of greenish-blue, growing in moist places on high mountains. Park, no. 382; Eagle Summit, nos. 383, 823.

SWERTIA PERENNIS L., var. OBTUSA (Ledeb.) Griseb. Collected only once, in the Alaska Range, beside a brook at Paxson, no. 384.

LOMATAGONIUM ROTATUM (L.) Fries, forma TENUIFOLIUM (Griseb.) Fernald in RHODORA **21**: 197 (1919). *Pleurogyne rotata* (L.) Griseb. β. *tenuifolia* Griseb. Occasional in marshy ground in the Interior. Fairbanks, no. 385; Wiseman, no. 966.

POLEMONIUM ACUTIFLORUM Willd. Very common in damp meadows throughout the region. Park, no. 668; lower slope of Eagle Summit, nos. 386, 825; Tanana, no. 387.

P. PULCHERRIMUM Hook. Circle Springs, no. 388.

PLAGIOBOTHRYS CUSICKII (Greene) Johnston. Introduced, Fairbanks, no. 1080-a.

P. COGNATUS Johnston. Dry ground, Fairbanks, no. 1080.

AMSINCKIA MENZIESII (Lehm.) Nels. & Macbride. Probably introduced. Rapids, nos. 395, 1023.

ERITRICHIUM ARETIOIDES (Cham. & Schlecht.) DC. Eagle Summit, no. 826-A; Porcupine Dome, no. 826.

A charming little fuzzy plant of the high mountains, with a rosette of hairy leaves at the base, rising from a woody root covered with brown leaves; the flowers in a capitate head, blue with a yellow eye, and very fragrant.

MYOSOTIS ALPESTRIS Schmidt, ssp. ASIATICA Vestergr. Twelve Mile Summit on the Steese Highway, no. 392; Wiseman, no. 967.

The "Forget-me-not" is the Territorial flower, found in alpine meadows, and moist ledges of the mountains.

MERTENSIA PANICULATA (Ait.) G. Don. One of the most conspicuous and graceful plants of open woods, common throughout the Interior. Curry, no. 567; Park, no. 669; Paxson, no. 397; Miller House, no. 827; Eagle, on the Yukon, no. 399.

STACHYS SCOPULORUM Greene. *S. palustris* L., subsp. *pilosa* (Nutt.) Epling. Fairbanks, no. 866.

Scutellaria epilobiifolia Hamilton. See Fernald in Rhodora **23**: 86 (1921). Fairbanks, no. 401.

Mentha canadensis L., var. glabrata Benth. In swampy land, beside the hot springs, Circle Springs, no. 404.

Prunella vulgaris L., var. lanceolata (Barton) Fernald, forma iodocalyx Fern. in Rhodora **15**: 179–186 (1913). Fairbanks, no. 403.

Linaria vulgaris Hill. In waste land, probably a garden escape. Fairbanks, nos. 405, 1058.

Veronica alpina L., var. unalaschcensis Cham. & Schlecht. *V. Wormskjoldii* Roem. & Schult. Rare. A mossy slope at Twelve Mile Summit, on Steese Highway, no. 408. See Fernald in Rhodora **41**: 450 (1939).

V. peregrina L. Waste land. Fairbanks, no. 1068.

Lagotis glauca Gaertn., var. lanceolata Hult. Fl. Kamtch. **4**: 105 (1930). Rare. Near snow patch on Eagle Summit, no. 836.

Castilleja hyperborea Pennell in Proc. Acad. Nat. Sci. Phil. **86**: 532 (1934). Eagle Summit, nos. 411 and 828.

C. pallida (L.) Spreng., subsp. caudata Pennell. Rapids, no. 1025. One specimen of this collection is yellow-villous and very glandular. Circle Springs, no. 413; Wiseman, no. 412.

C. sp. Other collections of *Castilleja* await further study.

Euphrasia mollis (Ledeb.) Wettst. In a low thicket on a hill behind the Lodge, Rapids, nos. 416, 1026.

E. subarctica Raup in Rhodora **36**: 87–88 (1934). Fairbanks, no. 868.

Pedicularis verticillata L. Occasional in subalpine regions. Park, no. 417; Rapids, no. 418; Wiseman, no. 972.

P. labradorica Wirsing. Common on dry hillsides, not usually in high altitudes. Park, nos. 419, 672; Miller House, no. 831; Circle Springs, no. 420; Wiseman, no. 971.

P. sudetica Willd. Fairly common in tundra. Miller House, no. 829; along road to Eagle Summit, no. 422.

P. Oederi Vahl. Abundant in wet ground below snow banks at base of Eagle Summit, but not seen elsewhere, nos. 421, 833.

P. Langsdorffii Fisch. Park, no. 670; Eagle Summit, nos. 423, 834.

A striking alpine Pedicularis with tall thick pink spikes. Rarely reported from the Interior.

P. lanata Cham. & Schlecht. Rare. Eagle Summit, nos. 424, 832.

Reported by Porsild in Rhodora **41**: 287 (1939), from the Alaska Range. Probably second record for the Interior.

P. capitata Adams. On dry stony slopes, occasional in alpine regions. Park, no. 671; Eagle Summit, nos. 425, 830.

Boschniakia rossica (Cham. & Schlecht.) B. Fedtsch. Rapids, no. 427; Wiseman, no. 973, where it was very abundant.

A strange looking plant, parasitic on roots of alder and spruce, growing in woods and thickets. It has a wide distribution in Alaska, as I saw it also in Seward. The Eskimo children called the plants "corn pipes."

PINGUICULA VULGARIS L. Many of the leaf rosettes were seen in a marsh in Wiseman, but I failed to collect them.

PLANTAGO MAJOR L., var. ASIATICA (L.) Decaisne. Circle Springs, no. 428.

GALIUM BOREALE L. Very common in dry soil on banks of streams and rivers in low areas. Fairbanks, no. 867; Circle Springs, no. 431.

A tall, showy Galium with many white flowers in compact panicles.

G. TRIFIDUM L. In moist places near Circle Hot Springs, no. 434.

VIBURNUM PAUCIFLORUM Raf. Very common in thickets along rivers. Rapids, no. 1016; Circle Springs, no. 439.

The red fruit of this tall straggling shrub, often called "High-bush Cranberry," is much prized for jellies and pies.

LINNAEA BOREALIS L. Specimens from Wiseman, nos. 437 and 974, belong to the typical form. See Fernald in RHODORA **24**: 210 (1922).

L. BOREALIS L., var. AMERICANA (Forbes) Rehder. Plants from Miller House, no. 837, have the funnel-shaped corollas. Common in rich woods and shaded thickets.

VALERIANA CAPITATA Pall. A common characteristic plant of moist meadows and subalpine tundra. Park, nos. 441, 674; Wiseman, no. 975.

CAMPANULA LASIOCARPA Cham. A handsome alpine species, called familiarly "Bluebells," growing in large clumps in gravelly soil. Common in the Interior. Park, no. 442; Rapids, no. 444; Eagle Summit, nos. 443, 839; Wiseman, no. 976.

C. UNIFLORA L. Rare in the mountains, but no doubt easily overlooked. My only collection was from Eagle Summit, no. 840.

SOLIDAGO MULTIRADIATA Ait. The most common and abundant Solidago with wide-spread distribution in dry soil. Park, no. 445; Rapids, no. 448, 1033; Circle Springs, no. 447; Wiseman, nos. 446, 977.

S. DECUMBENS Greene, var. OREOPHILA (Rydb.) Fernald in RHODORA **38**: 201–204 (1936). Occasional on sandy banks. Miller House, no. 841; Eagle, on Yukon River, no. 449.

S. LEPIDA DC., var. ELONGATA (Nutt.) Fernald in RHODORA **17**: 8–10 (1915). Along the Chena River, Fairbanks, nos. 451, 870.

Apparently the second record for the Interior.

ASTER JUNCEUS Ait. Circle Springs, no. 455.

Reported but twice previously from Alaska.

A. SIBIRICUS L. Very common throughout the region, especially on sandy banks of streams. Park, no. 453; Rapids, no. 1027; Fairbanks, no. 1059; along Yukon River, no. 454; Wiseman, nos. 456, 978.

Erigeron elatus Greene. *E. acris* L., var. *arcuans* Fernald. See Rhodora **40**: 347 (1938). Wiseman, no. 980.

E. angulosus Gaudin, var. kamtschaticus (DC.) Hara in Rhodora **41**: 389. *E. elongatus* Ledeb. *E. acris* L., var. *asteroides* of Am. Auth. Very common in subalpine regions. Rapids, nos. 458, 1028; Miller House, no. 843; Wiseman, nos. 457, 979.

E. lonchophyllus Hook. In a sandy location not far from the Chena River, no. 1064.

Apparently rare, as only other reports are from Fairbanks.

E. compositus Pursh, var. trifidus (Hook.) Gray. Probably occasional in high mountains. On a rock pile near Sable Pass in Park, no. 676-a.

Tufted with finely cut leaves and white flowers.

E. salsuginosus (Richards.) Gray. Along the Yukon River in thickets, Tanana, no. 460.

E. caespitosus Nutt. Along the Yukon River, no. 461.

E. radicatus Hook. Park, no. 676; Eagle Camp, nos. 459, 696.

Low, caespitose, with strong tap-root, growing in rocks. Similar in appearance, but in the Park specimen the leaves are less linear and inclined to be slightly lobed and base of heads more villous.

Antennaria philonipha A. E. Porsild in Rhodora **41**: 294, pl. 554 (1939). Park, no. 678.

This alpine species, recently named and described, differs from *A. monocephala*, its nearest relative, according to Porsild l. c. "by the thinner tomentum of leaves, the elongated offsets, tall and slender stems and by the larger pistillate heads." It has a wide range from the Bering Sea, the mountains of interior Alaska and Yukon Territory to the Arctic coast east of Mackenzie.

A. alaskana Malte in Rhodora **36**: 107 (1934). Rare in bleak, exposed gravelly places on high mountains. Eagle Summit, no. 464; on the very top of Porcupine Dome, no. 845.

A. Laingii A. E. Porsild in Rhodora **41**: 293 with pl. 554 (1939). Dry gravelly location near the Savage River, Park, no. 677 (mentioned by Porsild).

"By its densely matted growth, the very leafy stems and compact glomerulate ivory-white heads, it differs strikingly from all other boreal Antennarias" Porsild l. c. The type was collected by *H. M. Laing* at the head of the Chitina River. My specimens constitute the second record for this species.

A. pulcherrima (Hook.) Greene. This attractive Antennaria, often 15 inches high, grew abundantly in low open woods near the Koyukuk River, Wiseman, nos. 463, 982.

Rarely reported from Alaska. This is probably the second record.

ACHILLEA BOREALIS Bong. Very common throughout the Interior, especially along rivers. Rapids, nos. 468, 1036; Fairbanks, no. 1063; Rampart, on the Yukon, no. 469.

A. OCCIDENTALIS Raf. Fairbanks, no. 1061.

A. SIBIRICA Ledeb. *A. multiflora* Hook. Occasional on river banks. Fairbanks, no. 1062.

Leaves only pinnately divided.

MATRICARIA MATRICARIOIDES (Less.) Porter. *M. suaveolens* (Pursh) Buch. Common around settlements. Fairbanks, no. 475; Wiseman, no. 987.

ARTEMISIA BOREALIS Pall. Found growing plentifully on a steep, rocky hill near Gunnysack Creek, Rapids, nos. 447, 1034. A rare species in interior Alaska.

A. ARCTICA Less. Common on damp, mossy ledges of high mountains. An Asiatic-Western American species. Eagle Summit, nos. 478, 846; Porcupine Dome, no. 847.

A. FRIGIDA Willd. Occasional on dry hillsides. Fairbanks, no. 1066.

A. ALASKANA Rydb. in N. A. Flora **34**: 281 (1916). Gravel bars of a creek in Wiseman, no. 984.

These match the photograph of Rydberg's TYPE SPECIMEN in Gray Herbarium, collected by I. C. Russell on Yukon River between Nulato and Nowikakat, July 23–27, 1889. The second report for this species.

A. TILESII Ledeb. sens. lat. Very variable. Several specimens resemble var. UNALASCHCENSIS Besser (var. *elatior* Torr. & Gray). Common around roadhouses and towns. Park, no. 480; Rapids, nos. 482, 1035; Miller House, no. 848; Wiseman, nos. 481, 983.

PETASITES FRIGIDUS (L.) Fries. Common in alpine meadows and tundra. Park (in flower), no. 685; Wiseman (basal leaves only), no. 988.

ARNICA ATTENUATA Greene. A tall plant with strongly attenuated leaves, common in thickets and on dry hillsides in subalpine regions. Park, no. 681; Miller House, no. 849; along Yukon River, no. 483.

A. LOUISEANA Farr. Park, no. 679; on slopes of Eagle Summit. no. 850.

A Cordilleran species found at Lake Louise and other locations in the Canadian Rockies, in the mountains of interior Alaska, and the Gaspé Peninsula and western Newfoundland. See Fernald in RHODORA **35**: 368, pl. 270 (1933).

A. LESSINGII Greene. See Hultén, Fl. Kamtch. **4**: 193, pl. 6 (1930). Close beside the preceding species on Eagle Summit, nos. 486, 851. Also in the Park, no. 485.

An Asiatic-Western American Arnica, with pale yellow ligules, brownish pappus and nodding heads.

A. SP.? Resembles *A. Louiseana*, but the rays unusually long for that species. Miller House, no. 850-a.

SENECIO VULGARIS L. Probably introduced. Rapids, no. 1030.

S. PALUSTRIS (L.) Hook. In wet places in the mining dumps after the ground has been thawed by water pipes. Fox and Ester Creeks near Fairbanks, no. 488.

Conspicuous and tall, often 3 to 4 feet high.

S. LUGENS Richards. Abundant in thickets, along roadsides in lowlands and subalpine regions. Park, no. 492; Rapids, nos. 493, 1032; Fairbanks, no. 494; Miller House, no. 853; Wiseman, no. 985.

Tall and weedy, characterized by the black-tipped bracts of the involucre.

S. PAUPERCULUS Michx. Fairbanks, no. 491.

S. FRIGIDUS (Richards.) Less. *Cineraria frigida* Richards. Occasional in the mountains. Park, nos. 682, 683.

S. KJELLMANII A. E. Porsild in RHODORA **41**: 299 (1939). *Cineraria frigida* Richards., f. *tomentosa* Kjellm. Growing in moist places beneath snow patches on Eagle Summit, nos. 854, 855.

The heads are larger in this species, rootstock stouter, and whole plant woolly and tomentose. Rare in high mountains.

S. ATROPURPUREUS (Ledeb.) Fedtsch. in Fedtsch. & Fler. Fl. Eur. Russ. 992 (1910). *Cineraria atropurpurea* Ledeb.; *S. integrifolius* Kjellm. Eagle Summit, nos. 496, 856; Porcupine Dome, 856-a.

A striking plant with orange rays and stem and leaves gray with lanate wool, found commonly on the mountain slopes and dry alpine tundra in the Eagle Summit region. Usually a number of heads in a cluster, but several plants were collected at higher altitudes with a larger single head.

There is a resemblance between this species and specimens in the Gray Herbarium of *S. pyroglossus* Kar. & Kir. from the mountains of the northwestern part of Mongolia.

S. RESEDIFOLIUS Less. See Fernald in RHODORA **26**: 113–116 (1924), and Mem. Gray Herb. **2**: 259 (1925), for map of general distribution. Rare in the mountains. Eagle Summit, no. 852.

S. CONTERMINUS Greenm. On stony ground near the Big Delta River at Rapids, nos. 490, 1031.

SAUSSUREA ANGUSTIFOLIA DC. Fairly common in dry gravelly places and subalpine tundra of interior valleys. Park, no. 498; Miller House, no. 858; Circle Springs, no. 499.

S. ? MONTICOLA Richards. Wiseman, no. 986.

A tall plant, with the heads longer-peduncled. Similar to *S. remotiflora* Rydb. These three have been grouped under *S. alpina,* and more recently under *S. angustifolia* sens. lat., but at least *S. densa* seems distinct in the field.

S. DENSA (Hook.) Rydb. Eagle Summit, nos. 497, 857.

Low alpine plant with heads in a close cluster.

CREPIS NANA Richards. *Youngia nana* (Richards.) Rydb. Occasional in dry soil on alpine slopes. Park, nos. 505, 684; Rapids, nos. 506, 1029; Wiseman, no. 989.

Low and tufted, often stemless.

C. ELEGANS Hook. Apparently rare, but abundant at Miller House, in the piles of stones thrown out by placer mining, nos. 507, 859.

A taller plant, many-stemmed with a long tap-root.

TARAXACUM MUTILUM Greene. (Group *Ceratophora* Dahlst.) (determinavit G. Haglund 1938). Wiseman, no. 990.

T. KJELLMANII Dahlst. ("verosimiliter") (Group *Vulgaria* Dahlst.). Fairbanks, no. 1065.

T. KAMTCHATICUM Dahlst. (Group *Glabra* Dahlst.). Park, no. 686.

LACTUCA SCARIOLA L. Introduced. Miller House, no. 508.

L. PULCHELLA (Pursh) DC. Along Yukon River, no. 509.

THE STATUS OF CHAMAECYPARIS THYOIDES IN MAINE.—*Chamaecyparis thyoides* L., an Atlantic Coastal Plains species, has been of interest to Maine botanists since Dr. M. L. Fernald[1] pointed out that no specimens of the tree collected in Maine were known, although it had been reported from Kittery by Dr. G. L. Goodale. In August, 1916, however, "the remains of a once large area of *Chamaecyparis*" were found in the towns of Alfred and Lyman;[2] and in 1936 Dr. Anne Perkins[3] reported an extensive stand in Sanford, York County. Rossbach[4] discovered a small stand of stunted trees in a cold sphagnum bog at Knight's Ponds, Northport, Waldo County in the Penobscot Valley. He also reported the plant in the same region in Appleton, Knox County. Botanists of the University of Maine have inspected a stand of the species in Appleton, and have found it to be somewhat extensive and consisting of tall, vigorous trees equal to the best stand observed in York County.

[1] Fernald, RHODORA 5: 203, 1903. [2] Norton, Bull. Josselyn Bot. Soc. no. 6: 7, 1920.
[3] Perkins, RHODORA 38: 452, 1936. [4] Rossbach, RHODORA 38: 453, 1936.

On July 21, 1939, the writer, accompanied by Dr. R. H. True, found an extensive stand in Berwick, Maine. An estimate of the total acreage of *Chamaecyparis thyoides* in York County approaches 1000 acres. Botanists exploring bogs and cedar swamps in the coastal area between Kittery and the Penobscot Valley may well keep the tree in mind.—Oliver M. Neal, Jr., Michigan State College.

TRAVELS OF ASA GRAY IN WESTERN VIRGINIA, 1843*

Earl L. Core

In August, 1843, Asa Gray traversed the mountains of what is now West Virginia in the course of one of his expeditions to the Southern Appalachians, large portions of which were then relatively unknown botanically. Although several interesting discoveries marked his progress, his journal for this period is comparatively barren, alongside the detailed records of his explorations farther south in North Carolina. Millspaugh[1] reports that he was unable to trace his route through the State. Nevertheless, from the labels on some of his collections, from our knowledge of the highways existing in that day, and from the scanty references in his writings, it has been possible to outline his travels in this area with a considerable degree of accuracy.

Dr. Gray's first journey to the Southern Appalachians was made in 1841, a report of which was published in the American Journal of Science, in the form of a letter to Sir William Hooker.[2]

Although he expected to make many such southern expeditions (see his letter to W. J. Hooker, May 30, 1840), he was prevented from undertaking them because of the time required for the Flora of North America.[3] The new territories west of the Mississippi were being opened to exploration and for many years continually yielded an immense amount of new botanical material. Torrey and Gray interested themselves in the various

* Contribution No. 13 from the Herbarium of West Virginia University.

[1] W. Va. Geol. Surv. **5** (A): 4. 1913.

[2] Amer. Jour. Sci. Ser. 1. **42**: 1–49. 1841.

[3] A Flora of North America; containing abridged descriptions of all the known indigenous and naturalized plants growing north of Mexico; arranged according to the natural system. By John Torrey and Asa Gray. New York. 8vo; **1**: 1838–1840, pp. xvi + 711; **2**: 1841–1843, pp. 504.

expeditions, boundary surveys, and the like, and were constantly hard at work studying the collections that came in.

On April 30, 1842 Dr. Gray was appointed to the Fisher professorship of Natural History in Harvard College, removing in July to Cambridge, where, in addition to his teaching duties, he continued his research and writing, busier than ever. However, in the summer of 1843, with the sanction of the president and board of the college (see letter to Mrs. Torrey, July 22, 1843), he found time to break away from his work long enough to make the second of his southern tours.

He left Cambridge on August 11 for New York, from there proceeding to "the Alleghany Mountains in the north of Virginia", where he was to meet his friend, William Starling Sullivant, of Columbus, Ohio. The chief object of the expedition, from Dr. Gray's standpoint, was to "obtain live plants and seeds"; they expected to be too late in the season for the best botanizing, although he thought that he should "be in the best time for Compositae". Mr. Sullivant planned to devote "his attention primarily to the Musci"; between the two of them, they hoped to "let nothing escape".[4]

The expedition lasted nearly three months (Gray returned to Cambridge on November 3),[5] but while "the later and more interesting part" of the journey, in North Carolina, receives several pages of mention in letters and entries in his journal, the "long journey through Virginia" is dismissed in a more summary fashion. Sullivant was a pleasant companion and Gray recalled, years later, "the varied incidents of the arduous but delightful journey, ... the laborious mountain ascents, the night bivouacs, the healthful woodland life and primitive fare, and the many amusing adventures" of the tour which took them "along the principal length of the Alleghany Mountains, through much of their most picturesque scenery, and through regions which abound with the choicest botanical treasures which the country affords".[6]

Late in August the two friends met, apparently somewhere in the highlands of Western Maryland. Following the National Road (now U. S. Route 40) west from the Potomac at Cumber-

[4] Letter to W. J. Hooker, 11th August, 1843.

[5] See letter to George Engelmann, November 4, 1843.

[6] Amer. Jour. Sci. ser. 2. 1: 79. 1846.

land, "the Great Back Bone of the Alleghanies was crossed in Maryland, where it presents a pretty formidable elevation,[7] and several plants were observed which were thought to be confined to a more southern range, such as *Menziesia globularis* and *Galium latifolium.* The open *glades* on the other side presented many features of Kentucky vegetation".[8]

Leaving the National Road, probably at what is now known as Keyser's Ridge, the two explorers proceeded southwards through Oakland, Maryland, and entered Virginia "near Mount Carmel Town", in Preston County. From this point they descended via Horse Shoe Run to Cheat River at or near Westernford,[9] in Randolph County, thence to Tygarts Valley River. Their course through this "rude, wild region" must have been in general that now followed by U. S. Route 219.

After ascending the beautiful Tygarts Valley, years later the happy hunting ground for Millspaugh,[10] "the high Cheat Mountain was then traversed nearly where it merges in the Green Brier range, and *Angelica Curtisii,* Buckl., as well as *Aconitum reclinatum,* Gray, were first met with".[11] It is an interesting observation to note that in Robinson and Fernald's 7th edition of Gray's Manual, published in 1908, the range of *Aconitum reclinatum* is given as "Cheat Mt., Va., and southwards in the Alleghenies"[12] despite the fact that the point at which Gray collected the plant, on Cheat Mt., had been West Virginia territory for nearly half a century. Rydberg's *A. vaccarum,*[13] based on a plant he collected near Spruce Knob, in Pendleton County, West Virginia, is a representative of this species and should be so called. The only other known station for the plant in West Virginia is at Spruce, on the headwaters of Cheat River, in Pocahontas County. The present known distribution of *Angelica Curtisii* in West Virginia may be indicated as follows: Pendleton County: Spruce Knob, *Mr. and*

[7] The elevation is 2860 ft. at the point U. S. Route 40 crosses Big Savage Mt., as the northeastern continuation of Backbone Mt. is now called.

[8] Amer. Jour. Sci. ser. 2. **1**: 79. 1846.

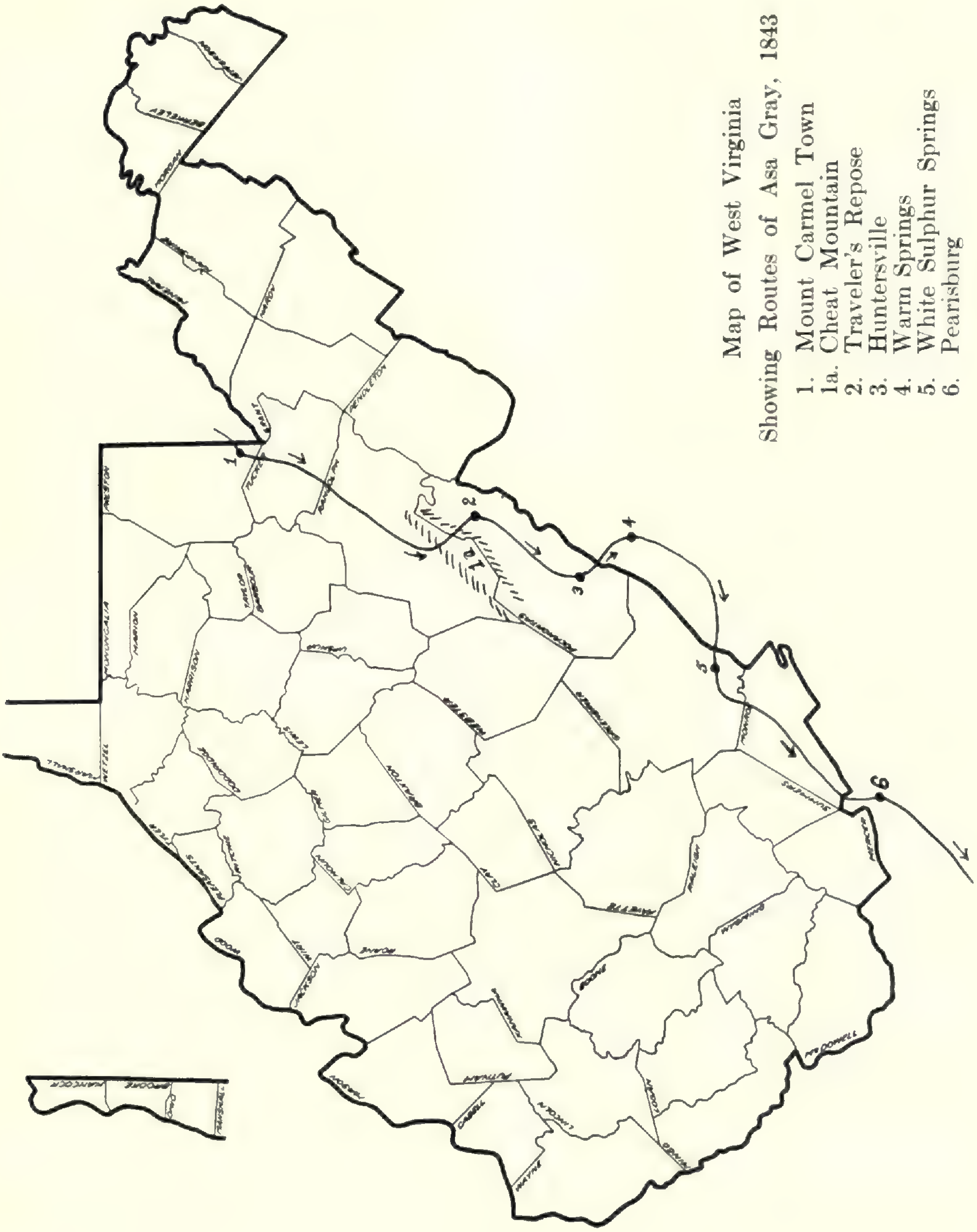
[9] Later St. George, which became the county seat of Tucker County when that county was separated from Randolph in 1856. Parsons, the present county seat, did not then exist.

[10] See Core, Contributions of Charles Frederick Millspaugh to the Botany of West Virginia. Proc. W. Va. Acad. Sci. **8**: 82–93. 1935.

[11] Amer. Jour. Sci. ser. 2. **1**: 80. 1846.

[12] Manual, p. 407.

[13] Torreya **26**: 31. pl. 1. 1926.



Map of West Virginia
Showing Routes of Asa Gray, 1843

1. Mount Carmel Town
1a. Cheat Mountain
2. Traveler's Repose
3. Huntersville
4. Warm Springs
5. White Sulphur Springs
6. Pearisburg

Mrs. Davis; Pocahontas County: Cass, *W. V. U. Bot. Exped.;* Grant County: Gormania, *Core* 3716.

In their trip across "the high Cheat Mountain",[14] the two travellers were benefited by the recently completed section of the Staunton and Parkersburg Turnpike traversing that area. This highway was authorized by an act of the Virginia Legislature in 1823, but appropriations were slow in following the authorization and it was not until 1842 that the road was extended down the Tygarts Valley River through Beverly, then the county seat of Randolph County. The splendid grades[15] of the Turnpike through the unbroken forest of Cheat Mountain must have made the penetration of this remote region quite easy indeed. Their "way crossed a towering range, hung above a far veil of unbroken spruce, forded swift glittering streams, and followed a road that passed rare isolated dwellings, dominating rocky and precarious patches and hills of cultivation".[16]

Eighteen years later, in the fall of 1861, Confederate and Union forces were marching and countermarching along this highway in the War between the States and a Union camp on the summit of Cheat Mountain was the highest point occupied by soldiers during the War. "The celebrated Battle Above the Clouds, on Lookout Mountain, was not one-half so high".[17]

East of the mountain, Gray and Sullivant descended to the Greenbrier River, the region of Hergesheimer's "Tol'able David," into a valley which "extended in deep green pastures and sparkling water between two high mountainous walls drawn across east and west. In the morning the rising sun cast long delicate shadows on one side; at evening the shadow troops lengthened across the emerald valley from the other".[18]

It is likely that the two travellers spent an August night at the far-famed hostelry, Traveller's Repose. This old Tavern

[14] Cheat Mountain has an elevation of 3798 ft. at the point traversed by the Turnpike, and 4433 ft. at Barton Knob, overlooking the Turnpike.

[15] This section was located by Claudius Crozet, who was formerly a surveyor on the staff of Napoleon Bonaparte, and it is a splendid commentary on his ability that modern engineers, laying out the course of U. S. Route 250 across Cheat Mountain, did not diverge from Crozet's survey at a single point along the 3-mile ascent of the western slope. See I. F. Boughter, "Internal Improvements in Northwestern Virginia," pp. 189–193, 205–214.

[16] From "Tol'able David." This description is applied by Hergesheimer to the next range to the east, Alleghany Mountain, but is applicable here as well.

[17] Hu Maxwell, "History of Randolph County," p. 140.

[18] From "Tol'able David."

was established before 1800 by John Yeager and in 1843, under the management of Andrew, John's son, was in the midst of one of its busiest periods, as a regular stage-coach stop and tavern house on the newly completed Turnpike. This highway was heavily used by emigrants going west and by statesmen from the west going to and from Washington and Richmond. It is said that Abraham Lincoln, when a Congressman from Illinois, used to stop at this house. The building was burned by Federal troops in 1861. The old tavern register, probably bearing the names of Asa Gray and W. S. Sullivant, likewise went up in the flames.[19]

Instead of proceeding eastward along the route of the Staunton and Parkersburg Turnpike, across Alleghany Mountain, the two botanists here turned to the south, towards the little hamlet of Huntersville, then the county seat of Pocahontas County. "In the journey through Pocahontas County to Huntersville, fruiting specimens of the little known *Rhamnus parvifolius* Torr. and Gr. Fl., were collected, a species which proves to be a perfectly distinct one, and has also been found by Mr. Buckley in Alabama".[20] Trelease later decided, however, that *Rhamnus parvifolius* should appear as a synonym of *R. lanceolata* Pursh.[21] Other known stations for this rare plant in West Virginia now include: Hampshire County: shale barren near Junction, *Strausbaugh;* Pendleton County: Smoke Hole, *Core* 4324.

Huntersville in 1843 "was by common consent regarded as a little place with large ways. It was no uncommon thing for Huntersville merchants to realize three or four hundred per cent on dry goods, and not much less on groceries",[22] dispensing to hunters and settlers who came to town.

Turning again eastwards near Huntersville, Gray and Sullivant once more enjoyed the privilege of traversing a recently built thoroughfare, the Warm Springs and Huntersville Turnpike, completed about 1838. "It was a grand highway for that period, and awoke a sensation much like our people felt at seeing cars coming to Marlinton. Every stream was bridged from Hunters-

[19] Pocahontas Times, January 25, 1940; an excellent article by Calvin Price on the history of Traveller's Repose.

[20] Amer. Jour. Sci. ser. 2. 1: 80. 1846.

[21] Syn. Fl. N. Am. 1: pt. 1, 407. 1895-1897.

[22] Wm. T. Price, "Historical Sketches of Pocahontas County," p. 587.

ville to the Warm Springs, and the means of communication at the time between those places seemed to be all that was desired or could be reasonably expected".[23]

"In the route eastward across the mountains from Huntersville to the Warm Springs, the rare *Helianthus laevigatus,* Torr. and Gr., and *Andromeda floribunda,* Pursh., (which is *A. montana* of Buckley,) were abundantly found. A mountain meadow on Nap's [Knapp's] Creek, east of Huntersville, also furnished a stout *Gentian* with crowded ochroleucous flowers, and with much the habit of *G. Andrewsii.* It was naturally enough confounded with *G. ochroleuca,* and specimens have been distributed under this name. It is, however, quite a different species from the real *G. ochroleuca,* though it may be the plant figured under that name in Sims. Bot. Mag. t. 1551, as well as the form mentioned by Grisebach (in Hook. fl. Bor. Am.) as remarkable for its cordate-lanceolate leaves".[24] Temporary diagnostic characters were given for the new species, and it was named *G. flavida.* No mention is made in Gray's account of the extensive shale barrens between Huntersville and Warm Springs, nor of the interesting species now known to inhabit the barrens.

Other stations of *Helianthus laevigatus* in West Virginia, represented by specimens in the State Herbarium, include: Hardy County: South Branch Mountain, *Sharp;* Greenbrier County: Kate's Mountain, *W. V. U. Bot. Exped.;* Mineral County: Wild Meadow Run, *W. V. U. Bot. Exped.* *Andromeda floribunda* is still little known in West Virginia, although abundant enough in localities where it does occur. The distribution may be given as follows: Greenbrier County: Alleghany Mountains, *Hopkins,* Pendleton County: Top of Shenandoah Mountain, *Core* 4895; Pocahontas County: near Cass, *Fred W. Gray.* In addition to the Pocahontas County station, *Gentiana flavida* is now known from Greenbrier County, near White Sulphur Springs, where it was collected by Ben R. Roller.

"From the Warm Springs the expedition pursued its course, by way of the Hot Springs[25] and the white Sulphur Springs, along

[23] Ibid., p. 73.

[24] Amer. Jour. Sci. ser. 2. 1: 80. 1846.

[25] Their course in general must have followed the present U. S. Route 220 to Covington, thence U. S. Route 60 to White Sulphur Springs, thence U. S. Route 219 through Union, Salt Sulphur Springs, and Red Sulphur Springs.

the base of Peter's Mountain to the Kanawha [New] River, which was crossed at Toney's Ferry below Parisburg [Pearisburg], and thence to Tazewell county. In Giles County, soon after crossing the river, live roots of the very rare and distinct *Heuchera hispida*, Pursh, were obtained, which have been preserved in cultivation."[26]

Summarizing, in a letter to John Torrey, written at Asheville, North Carolina, on September 30, Gray says: "Our long journey through Virginia brought us behind our estimated time, and hurried the later and more interesting part of our operations . . . . I doubt if I got anything of much interest in Virginia, except Buckley's (and Nuttall's) *Andromeda, Rhamnus parvifolius* on the waters of Greenbrier (where did Pursh get it?), *Heuchera pubescens* in fruit and *Heuchera hispida* Pursh ! ! out of flower and fruit, so that I detected it by the leaves only (and got good roots), not far from where Pursh discovered it, but more west, on the frontiers of a range of mountains where this very local species doubtless abounds".[27]

The Bryophytic results of the expedition appeared in the form of a few privately distributed books which contained actual specimens of mosses collected by Sullivant and his friends. The complete title of this work was "Musci Alleghaniensis, sive Spicilegia Muscorum atque Hepaticarum quos in itinere a Marylandia usque ad Georgiam per tractus Montium A. D. MDCCCXLIII, decerpserunt Asa Gray et W. S. Sullivant: (interjectis nonnullis aliunde collectis) Cincinnavit et exposuit W. S. Sullivant. Fascis I, II, Columbus in Ohione MDCCCXLV."

West Virginia University,
Morgantown

[26] Amer. Jour. Sci. ser. 2. **1**: 81. 1846.
[27] See Wherry, "Heuchera hispida Pursh rediscovered." Rhodora **35**: 118, 119. 1933.

POLLINATION OF THE ERICACEAE: V. GAYLUSSACIA BACCATA[1]

Harvey B. Lovell

Gaylussacia baccata (Wang.) Koch, the black huckleberry, is an extremely common shrub in sterile pastures and granitic hillsides of southern Maine where it grows in the most unfavorable of locations. The flowers are grouped in one-sided racemes on the wood of the previous season. At the time of blooming in June the new growth, already several inches in length, is rapidly concealing the flower clusters from above. The number of flowers in an inflorescence is from 3 to 8, the average of 26 being 6.02, and the number of racemes on a branch was found to range from 3 to 8.

The flowers vary from dark red to light pink. Both the pedicels and the two bractlets are reddish as are the bracts. The latter, however, are early deciduous, only an occasional one being found persistent at the time of anthesis.

The tapering corolla is from 5.5 mm. to 6.5 mm. in length. It narrows slightly at the mouth leaving an opening only 1.5 mm. in diameter which is partially filled by the round capitate stigma. Like the foliage both the calyx and outside of the corolla are covered with globules of waxy secretion.

The pistil consists of an inferior 10-celled ovary bearing on its apical surface a thick, fleshy nectary (Fig. 1, C) which surrounds the base of the style. The very glutinous stigma is obscurely five-lobed (Fig. 1, B).

The yellow anthers terminate in long tubes which open by elongated pores (Fig. 1, D). The broad, flat filaments with the aid of their ciliate margins form a collar around the nectary.

The flowers were found to vary in size and shape between two extremes. The more common type was long, slender and tapering with the stigma exactly in the mouth of the corolla (Fig. 1, F). The other type was shorter and broader with the stigma slightly exserted (Fig. 1, E). Similar variations in size have been reported in *Vaccinium vitis-idaea* by Warnstorf and also by Warming.[2]

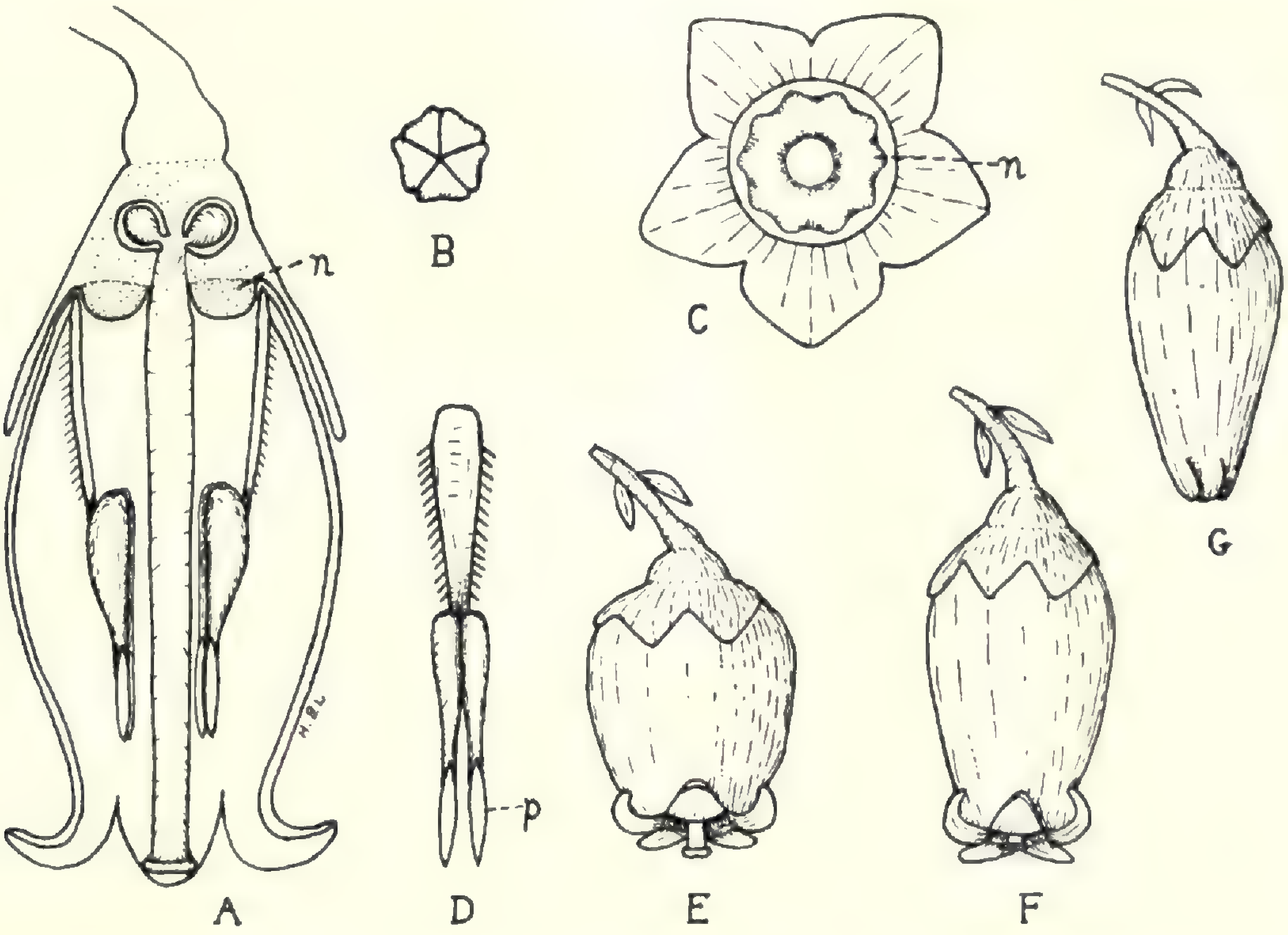
The flowers are homogamous. In mature buds beginning to open, the stigma was already glutinous, the anther pores open and the

[1] Contribution from the Biology Department, University of Louisville.

[2] Knuth, P. and J. R. Ainsworth Davis. Handbook of Flower Pollination, p. 30, 1909.

pollen mature. Anthesis lasts for several days at the conclusion of which the corolla and stamens fall off together. The style persists a little longer.

Usually nectar secretion is rather scanty, a few drops being present on the nectary near the base of the style. After a rainy night many flowers were found to have secreted from one to two mm. of nectar which was held in place in the center of the flower by the filaments. Old flowers, which could be recognized by their easily dislodged



corollas, were entirely devoid of nectar. This shows that nectar secretion ceases entirely soon after fertilization. By the afternoon of the same day, a warm sunny day, nearly all the nectar had disappeared. Flowers kept for 40 hours in a cool, damp cellar accumulated as much as 4 mm. of nectar. That this was not condensation of moisture was shown by the fact that old flowers again contained no nectar.

The flowers have a slightly sweetish odor.

Pollination of the flowers is accomplished chiefly by Andrenid and honeybees, but the number of visits received by the flowers was small. Insect visitors must pass their tongues between the style and anthers, thus shaking the pollen onto their faces. When such an insect visits

the next flower, the pollen-covered parts strike the protruding stigma on the glutinous surface of which pollen clings readily, completing the process of cross-pollination. Nearly all the stigmas examined had pollen clinging to them.

In the absence of insect visits pollen falling from the anther tubes is almost certain to strike the glutinous stigma. In order to determine whether self-pollination results in a set of fruit, five plants, bearing respectively 26, 27, 16, 12, and 30 buds were covered with cheese cloth bags on June 21. When examined on Aug. 22, not a single fruit was found. One plant had died but the others had grown vigorously. The set of fruit on the neighboring plants was rather light due probably to the paucity of insect visits but many plants had set from two to five berries. The evidence indicates that *Gaylussacia baccata* is self-sterile and entirely dependent upon insects for cross-pollination.

The following insects were sucking nectar except where otherwise indicated. All insects were collected at Waldoboro, Maine, from June 15 to June 21.

HYMENOPTERA. Apoidea: *Apis mellifera* L. ☿, *Andrena vicina* Smith ♀, *A. lata* Viereck ♀, collecting pollen, *Nomada cuneata* Robt. ♀.
LEPIDOPTERA. Nymphalidae: *Brenthis myrina* Cr.; Lycaenidae: *Incisalia niphon* Hbn.
THYSANOPTERA. *Thrips sp.*, common wandering around in flowers.

University of Louisville,
Louisville, Kentucky.

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A CENTURY OF ADDITIONS TO THE FLORA OF VIRGINIA[1]

M. L. Fernald

(Plates 626–649)

Part I. Itinerary of Five Field-trips

Aided by a generous and greatly appreciated grant from the Penrose Fund of the American Philosophical Society, I was able to continue botanical exploration on the Coastal Plain of southeastern Virginia at intervals from June to October, 1939. Half the grant was used to cover the expenses of an all-summer botanical reconnaissance of the lower Santee valley in South Carolina (the home of Thomas Walter and a collecting ground of Stephen Elliott) by my students, Messrs. Robert K. Godfrey and Rolla M. Tryon, Jr., their results to be published in a separate paper. With the portion of the grant retained for the Virginia work I employed our already proved and efficient helper, Mr. Leonard Birdsall, maintained the established headquarters at Mrs. Bowman's at Century House, south of Petersburg, and met the expenses of equipment and a portion of those of travel.

Mr. Bayard Long, most happily, was able to join me for all five trips, most happily because the eastern Virginia work has

[1] Exploration done with the support of a grant from the American Philosophical Society.

now become intensive and wholly eclectic, with little or no attention devoted to the ubiquitous and well known species, our eyes being always on the alert for something which "does not register." Occasionally the failure of a plant to "register" proves humiliating but in two out of three cases the plant we do not at once recognize from the car or in walking through the unspoiled areas justifies a special stop; most often it is quite new to the known flora of the region and it frequently leads to the discovery of a new and productive habitat. Without Long's keen knowledge of Coastal Plain plants and his persistence in following clues to successful discoveries too many rare and excessively localized species would be overlooked. As it is, we are often amazed to find in supposedly familiar areas plants of great significance which, diverted by some other species, we must previously have overlooked. For instance, in June, 1939, attracted by an unusual composite, we slowed down near Applewhite's Church—to collect for the first time the remarkably distinct *Tetragonotheca helianthoides*,[2] a southern monotype (MAP 1), based by Linnaeus partly upon a Virginian specimen of Clayton's, but certainly rare in eastern Virginia. That discovery soon led us to a rich strip of undisturbed woodland along the Nottoway near Carey Bridge, on the plantation of Mr. S. R. Westbrook, who readily granted us permission to botanize over the area. Our interest absorbed by many unusual species, we perhaps had blind spots for others. At any rate, returning in June, 1940, we found on the springy wooded slopes which we had canvassed during three days at the same season the year before such extraordinarily conspicuous species as an *Aconitum*, leaning and twining on the neighboring shrubs, a plant not yet in flower but presumably *A. uncinatum* of the interior; the true and famously rare *Sphenopholis pallens*

[2] In this, as in preceding papers of this series, the authors of species are omitted in the narrative if they are in Gray's Manual. The preceding papers on the work in Virginia are as follows: Fernald & Griscom, *Three Days of Botanizing in Southeastern Virginia*, RHODORA, xxxvii. 129–157 and 167–189, 20 plates (1935)—Contrib. Gray Herb. CVII; Fernald, *Midsummer Vascular Plants of Southeastern Virginia*, RHODORA, xxxvii. 378–413 and 423–554, 22 plates (1935)—Contrib. Gray Herb. no. CIX; Fernald, *Plants from the Outer Coastal Plain of Virginia*, RHODORA, xxxviii. 376–404 and 414–452, 13 plates (1936)—Contrib. Gray Herb. no. CXV; *Local Plants of the Inner Coastal Plain of Southeastern Virginia*, RHODORA, xxxix. 321–366, 379–415, 433–459 and 465–491, 14 plates (1937)—Contrib. Gray Herb. no. CXX; *Noteworthy Plants of Southeastern Virginia*, RHODORA, xl. 364–424, 434–459 and 467–485, 27 plates (1938)—Contrib. Gray Herb. no. CXXIII; *Last Survivors in the Flora of Tidewater Virginia*, RHODORA, xli. 465–502, 529–559 and 564–577, with 14 plates (1939)—Contrib. Gray. Herb. no. CXXVIII.

(Spreng.) Scribn.,[3] of which, as stated by Hitchcock (*Man.*), "The only other specimen [besides the original of more than a century ago, sent by Muhlenberg to Sprengel, supposedly from Pennsylvania] known is the type of *Eatonia aristata* collected [somewhere] in South Carolina by Curtiss"; and, beneath them, carpets of a reclining rhizomatous *Cardamine*, with showy petals deeply cleft like those of some species of *Silene*. A few miles away, in another area north of Applewhite's Church, where we had extensively botanized one year earlier, there was a very definite and apparently heretofore unrecognized *Carex*, although it exists, misidentified, in some of our herbaria from Georgia and Florida. In these cases, each species is so highly localized that, passing a rod or two on either side of their small colonies, we might easily have missed them all the second year. They again illustrate the truism, that no area is ever fully worked out. Needless to state, it was Long who first detected three of the four.

Our first field-work of the summer of 1939 was from June 11–24. We had some problems left over from previous years which demanded immediate attention. On our first trip on the inner Coastal Plain, in June, 1936, we were amazed to find in open woods and clearings a species of *Andropogon* in the prime of flowering and early fruiting. Dreading the complexity of the genus, we tentatively set it aside as an aberrant colony of *A. scoparius*, a variable species normally flowering in September and October. But the plant could not be thus disposed of. Every June it abounds in open woods, clearings and fields as a regular element in the late-spring and earliest-summer vegetation, from Dinwiddie County at the west, York County at the east, thence south nearly to the North Carolina line; and Godfrey & Tryon got it, over-ripe and shattered in July, in southeastern South Carolina. Best of all, it has strong morphological characters separating it from *A. scoparius*. It is a vernal species, nearest related to an autumn-flowering endemic of Texas. It will be described and illustrated (PLATE 626) in Part II.

Another characteristic plant of the region, also found by us in June, 1936, and subsequently much collected, from May into July, on the rich wooded bottomlands, is a gigantic quillwort,

[3] *S. pallens* true, not that of most treatments, which is the transcontinental *S. intermedia* Rydb.

Isoëtes. Flaccid and sprawling in the richest woods, with bulbs up to 3 cm. in diameter and loose rosettes up to 9 dm. across, it always fascinates us, for it is decidedly not an aquatic; and on many bottomlands, from Dinwiddie County to Greensville and western Nansemond, it is impossible to walk in June without trampling upon it. It proves to be the little known *I. Engelmanni* var. *caroliniana* A. A. Eaton, described from along creeks tributary to the Tennessee River in westernmost North Carolina but subsequently found in Georgia (map 2), another of the upland and inland types reappearing on the Coastal Plain of Virginia.

These were a good start and on our first full day in the field (the 12th) we began brand new discoveries. On one of the earlier trips we had hoped for good things about Taylor's Millpond in southeastern Greensville County but, alas, it is a conventional millpond, formed by damming a stream, with water lapping the drowned marginal forest and without a natural beach, such as we are constantly seeking. Taylor's Millpond was promptly given a black mark. On June 12th, however, the region came into botanical favor. After making brief visits to old areas near Skipper's and Dahlia, we took the dirt road east from Skipper's (that from Dahlia has become impassable), planning to explore via any side road which looked tempting. Suddently, beyond an open pine wood, we saw a swale. That meant moisture and perhaps a sphagnous bog. Sphagnum was there in abundance but we were on a ruined remnant of several acres of what was once a good habitat. The plow had been there, although, as is so often the case, the heavy and soggy clay land is unfit for agriculture. Only a few of the original bog plants remained, *Panicum strigosum* and some Droseras; but here was the greatest assemblage imaginable of the bog species of *Lycopodium*, which seemed to have profited by cultivation of the land. *L. alopecuroides* and *L. inundatum* vars. *adpressum* and *Bigelovii* formed a nearly continuous carpet, and at one end of the swale there was the rare *L. carolinianum*. It is sometimes listed as a Virginian, but in their monograph of the genus (1900) Lloyd & Underwood were unable to cite any specimens from between southeastern North Carolina and southern New Jersey, although it has long been known at a single station in Prince George

County, Maryland. In June *L. carolinianum* was very immature but we made regular monthly calls, to watch its development. On our September visit the swale was under two feet of rain-water. We then wallowed and tumbled about the submerged furrows, well above our knees in muddy water, and, reaching arm's-length below, pulled up strobiles of *L. carolinianum* 7½ cm. long, of *L. alopecuroides* 1 dm. long and of *L. inundatum* var. *Bigelovii* 1.1 dm. long, of var. *adpressum* 1.2 dm. long. After this hydropodic and most novel adventure among the *Lycopodia* we gladly replaced Taylor's Millpond upon the botanical map.

Taylor's Millpond further justifies its existence as a focal point of botanical note because slightly to the southeast a dirt road leads across and along the wooded bottomland of Fontaine Creek into North Carolina. The bottomland, where not too heavily wooded, is a tangle of southern sedges, *Carex louisianica* Bailey up to 7.5 dm. high (Mackenzie says 2–6 dm.), *C. crus-corvi* var. *virginiana* Fernald, *Scirpus atrovirens* var. *flaccidifolius* Fernald, and several others. At the upper border of the bottomland there is a fine clump of *Amsonia Tabernaemontana,* the typical variety, not recorded by Woodson in his monograph of the genus as native north of South Carolina. Farther out, at the margin of the Creek, *Sagittaria Weatherbiana* Fernald mingles with an orchid with oblanceolate leaves 3–3.5 cm. broad. In June the latter was not yet flowering, and the colony was deep under water until the end of September, when, from among the clay-crusted leaves, the characteristic long raceme showed it to be *Spiranthes cernua* var. *odorata* (Nutt.) Correll (*S. odorata* Nutt.), a giant plant for its group, though in September and October we found it on tidal marshes farther north reaching a greater stature (up to 7.5 dm. high).

On the 14th, Godfrey, on his way to South Carolina, joined us for half-a-day. After showing him some of the specialties between Petersburg and Emporia, we drove east to look at the bottomland of Three Creek, between James River Junction and Grizzard. In what was once a sphagnous bog along the Southern Railway *Sarracenia flava* and a few other bog species still held their own (though apparently completely obliterated by ditching operations later in the summer). Here was a new in-

land limit for *Erigeron vernus,* and the second station in Virginia and east of the Mississippi valley of *Eleocharia tenuis* var. *verrucosa* Svenson. On the bottomland, where we went to show Godfrey *Glyceria arkansana* Fernald and other species not recorded from neighboring North Carolina, we were greatly impressed by *Peltandra virginica.* In New England, New Jersey and Pennsylvania the plant we know by that name has a tightly rolled green spathe with closely appressed pale margins which loosen without spreading more than just enough to allow the entrance of insects and snails to the closely surrounded whitish spadix. Here on Three Creek, however, the spathe loosely opens, its creamy-white margin spreading and fully exposing the deep orange-yellow spadix. At the summit of the enclosed ovary the spathe is circumscissile, a deliquescent band soon developing at this point, so that the limb of the spathe very soon drops off, leaving a truncated young fruit. This prompt circumscission of the limb of the spathe I have not seen in Massachusetts. Furthermore, the pale spadix of the northern plant is covered with flowers essentially to its tip; the orange-yellow spadix of the eastern Virginian has the upper inch or so often sterile. On all the streams we have yet visited in southeastern Virginia *Peltandra* is uniform; and Dr. Lily M. Perry informs me that this plant with open spathe and yellow spadix is what she knew in Georgia. *P. virginica* was based on the brief description by Gronovius of the Virginian plant of Clayton. It is probable that the northern plant is not *P. virginica.* The spathe and spadix of each will be shown in PLATES 627 and 628.

Attending the meeting of the Botanical Society of America at Mountain Lake and Blacksburg, where we were the guests of Professor and Mrs. Massey, we got back into our special field-work on the 18th. Wishing to check on *Peltandra,* we took a side road, leading from near the Prince George-Sussex County line from the Jerusalem Plank Road across to Stony Creek. On the first bottomland, that of Jones Hole Swamp, we were collecting the calla-like spathes when a passing fisherman, looking down from the bridge, remarked: "Oh! getting water lilies?" That seems to be a general name for *Peltandra virginica* in the region, more appropriate to it than to the northern plant. On the wooded bottomland of Jones Hole Swamp *Rhododendron*

canescens was frequent, the first we had met in Virginia, though we afterward got it in woods along other portions of the Nottoway system. This is true *R. canescens,* as restricted by Rehder, who, in his monograph of the group, gives its range as extending "from southwestern Tennessee and southern central North Carolina" southward and southwestward. Somewhat northeast of Stony Creek and again both north and south of that botanically productive center swampy woods were characterized by pin oak, *Quercus palustris,* which we also found along Three Creek, farther south. We had never before met it on the Coastal Plain of the state and Sargent (*Man.*) cites it as occurring in Virginia south of the Potomac only in the mountains (Wythe County). It has, however, been reported from several counties, including Amelia, which approaches the Coastal Plain, and Charles City County which is upon it. As it turned out, the day was primarily devoted to trees and shrubs. Driving eastward to Sussex Courthouse, then to Homeville and Waverly, we stopped on the west side of the Nottoway, where the ash-keys attracted us by their extreme smallness. They were on *Fraxinus americana,* var. *microcarpa* Gray, a southern extreme which we had not previously met. On the east side of the river, nearer Homeville, the forest was so rich that we returned next morning for further collecting. *Carya ovata* var. *pubescens* Sargent, recorded from Alabama and Mississippi northward into South Carolina and Tennessee, abounded, and with it the southern *C. pallida* Ashe. At one point in the drier forest above the bottomland *Arabis canadensis* abounds, our first Coastal Plain station; and near it was a carpet of *Paronychia fastigiata,* var. *paleacea* Fernald, heretofore known only from Delaware and Pennsylvania to Illinois and Tennessee. Another extension southward to Virginia was noted when we stopped, as we usually do, at the border of Assamoosick Swamp, northeast of Homeville. A bramble there was one of the arching or doming but tip-rooting series midway between dewberries and high blackberries. I cannot separate the material from that of *Rubus Janssonii* Bailey, of southern New England.

Exploring, still unsuccessfully because of the clearing of land and the turning in of hogs on most boggy areas, with the hope of rediscovering Pursh's stations of 137 years ago, some of them

on "boggy meadows near Dr. Gray's,[4] Southampton", others simply from "swamps, Southampton", we covered much of the county. Pursh's material, at the Philadelphia Academy, shows familiar Southampton County plants, such as *Stillingia sylvatica, Asimina parviflora, Quercus laevis, Sarracenia flava, Amianthium Muscaetoxicum, Lobelia glandulifera, Carphephorus bellidifolius* and *tomentosus,* and others which are now very local. But we wanted to find in the county *Gentiana Stoneana* Fernald (*G. linearis* in Pursh's herbarium), from "swamps, Southampton" and *Asclepias paupercula,* "wet swampy woods, Southampton". We already have them from farther east, so that their rediscovery is of secondary importance. But of the very first importance is the fact that Pursh got in "swamp, Southampton" the very rare *Litsea geniculata,* probably not subsequently collected in the state; and "in rich hedge-rows, Dr. Gray's", *Baptisia villosa,* a species also collected by Canby near Franklin in 1867. As yet these two are unknown as living species in the state. During these searches we found on the old road from Sebrell to Courtland an area of white sand, with the remnant of a forest of Catesby's oak, *Quercus laevis,* and with *Q. cinerea* Michx. at a new northern limit. *Stillingia* is abundant, perhaps where Pursh got it, but at its northernmost known station; *Bulbostylis ciliatifolius* (Ell.) Fern. also is there at its northern limit, and at the margin of Assamoosick Swamp *Nyssa sylvatica* var. *dilatata* Fernald abounds. The area was so promising that we registered it for later visits.

I have referred in the opening paragraphs to the region of Applewhite's Church and of Carey Bridge. Here is an area of alternating rich loamy (often calcareous) woodland, more sterile sandy woods and wooded bottomland. The unique *Tetragonatheca* (MAP 1), with four big foliaceous bracts subtending the sunflowerlike heads, the distinctive achenes becoming conspicuous, was found in two spots. In the woods were *Onosmodium virginianum* and a complex series of *Houstonia,* from typical *H. lanceolata* to extreme *H. tenuifolia.* It begins to look as if Gray's old treatment, of combining several of these as variations of one species, were sound. *Polygala polygama* abounds and is

[4] Edwin Gray, proprietor of much of Southampton County in the late 18th and early 19th centuries, buried between Sebrell and Wakefield.

strikingly unlike the more northern plant in its very lax raceme with distant and relatively large flowers. It is true *P. polygama* of Walter at its northern limit, the plant of the North, with more crowded and mostly smaller flowers being var. *obtusata* Chodat. *Viola triloba* var. *dilatata* (Ell.) Brainerd ("southwestern Louisiana northward to northern Oklahoma, southern Missouri, and southern Illinois; thence eastward to northern Georgia and western North Carolina") was there, with scattered *Chamaelirium luteum* and *Carex striatula*. *Viburnum rufidulum*, rarely flowering, was here heavily in bloom, some of the trees 20 feet high, with trunks 4 inches in diameter, the blackish bark broken into rectangular blocks suggestive of the bark of *Diospyros*. Small trees of *Vaccinium arboreum* (up to 20 feet high, with trunks a foot in diameter, the main branches 6 inches through) were also very beautiful, with their loads of milk-white drooping flowers.

At the point where Mr. Westbrook's bridge crosses Three Creek an old woodroad leads up the latter stream to pits from which the shell-marl was long ago dug out. Here, as exclusively in lime as elsewhere in eastern Virginia, *Equisetum arvense* and *E. hyemale* var. *affine* abound; and the thousands of plants of *Ponthieva racemosa* (Walt.) Mohr give encouragement that this southern orchid may hold its own in Virginia. In deep woods along the bottomland *Ampelopsis arborea* occurs and near it sterile plants which could be only the rare *Chelone obliqua;* and later in the year we here established a new southern limit on the Coastal Plain for the Canadian and Alleghenian *Prenanthes altissima*.

At a crossing of Three Creek slightly farther up-stream, on the road north from Applewhite's Church, *Rhododendron canescens* abounds; and on the steep slopes with *Antennaria solitaria* we got our first Coastal Plain material of the upland *Cunila origanoides*.

The last full day in the field in June (23rd) we went to some of the old ferry-landings on the Nottoway and the Blackwater. The tidal shore at Knight's Seine Beach (Battle Beach of the contour-sheet) on the lower Nottoway was showy with masses of flowering *Zizaniopsis*, with great swales of *Rhynchospora caduca* Ell. and other nice species farther back, but our great prize here

was the first collection of the season (by no means the last) of the estuarine *Isoëtes saccharata*, not seen by Pfeiffer from south of the Potomac at Alexandria. Later in the summer and autumn it proved to be a regular inhabitant of tidal shores. Since Battle Beach is almost in North Carolina, just above the junction of the Nottoway and the Blackwater which form the tidal Chowan River, the *Isoëtes* will certainly be found in North Carolina. At Cobb's Wharf,[5] on the west bank of the lower Blackwater, there are good swales. *Panicum albomarginatum,* not too common in Virginia, was in fine condition and *Lysimachia producta,* which we had not previously collected in the state, abounded, quite by itself, with no *L. quadrifolia* nor *L. stricta* (sometimes thought to be its parents) seen. Best of all, there were splendid great clumps in perfect vernal flowering of one of the very rarest of grasses, *Panicum cryptanthum* Ashe, which had been unknown between southeastern North Carolina and its local stations in New Jersey.

These old landings, long ago cleared of heavy timber, thus offering sunshine, as compared to the darkness of the neighboring cypress and gum forests, were so full of local species that we at once conceived the idea that the old landings on the east side of the Blackwater would yield their quota of novelties. The contour-sheet showed below South Quay bridge a tempting series, George's Bend, Milk Landing, Cox Landing, Sandy Landing and Cherry Grove; and Wyanoke at a point which, if it were west of the Blackwater, would be in Virginia. At this area along the Blackwater, the boundary between Virginia and North Carolina suffers what the geologist would call a nonconformity or perhaps a fault. From below False Cape, on the Atlantic coast, westward to the Blackwater the boundary line is at latitude approximately 36° 48′, but from the Alleghenies eastward to the Blackwater it is nearer 36° 46′. We were told that when the early boundary surveyors came from the west and from the east in two parties they failed by more than half-a-mile to meet at the Blackwater and their miscalculation is still sacred.

When, in 1936, I first approached western Nansemond I had left Long at home to make up sleep and with Carroll Williams

[5] On some of our earlier labels we mistook Smith's Ferry on the Nottoway for Cobb's Wharf on the Blackwater. No plants of critical importance are involved, since most of them share the two adjacent localities.

crossed the bridge at South Quay from Southampton County. I hoped, somewhat blindly, to find a continuation southward of the white-sandy pine barrens which occur south of Zuni (farther up the Blackwater). As I then wrote, "Expressing my hopes to the drawtender, I received the reassuring reply, accompanied by a general sweep of his arm toward Nansemond County: 'Thar's a powerful lot of right smart sand over thar'."[6] We consequently took the firm road southeastward to Factory Hill, thence to Somerton, and on many subsequent days this route and its arteries have led us through southwestern Nansemond. It would not serve, however, if we were to get to the old landings on the Blackwater. We had formerly let the wheels of the car make our decision for us and they had automatically followed the hard road. Now, putting our own minds to the task, it was clear from the contour-sheet that between the Factory Hill road and the river there are no good roads; the area has a loose mesh of dotted lines indicating only "poor roads" and paths, and much of the region is uncleared. Following the first "poor road" southward from east of the bridge, we soon found ourselves in loose white sand, the road crossing deeply drowned and loosened or floating corduroys over the rain-swollen branches, so that Long and I had to get out and, standing in deep water, hold floating logs at each end of the submerged bridge while Leonard "bucked" the bridge, the water often flooding the body of the car. Only a driver with Leonard's skill would attempt such a road, but through two years now he has not balked, except when, trying a swollen branch and finding the water nearly up to our hips, we have concurred in his decision not to cross.

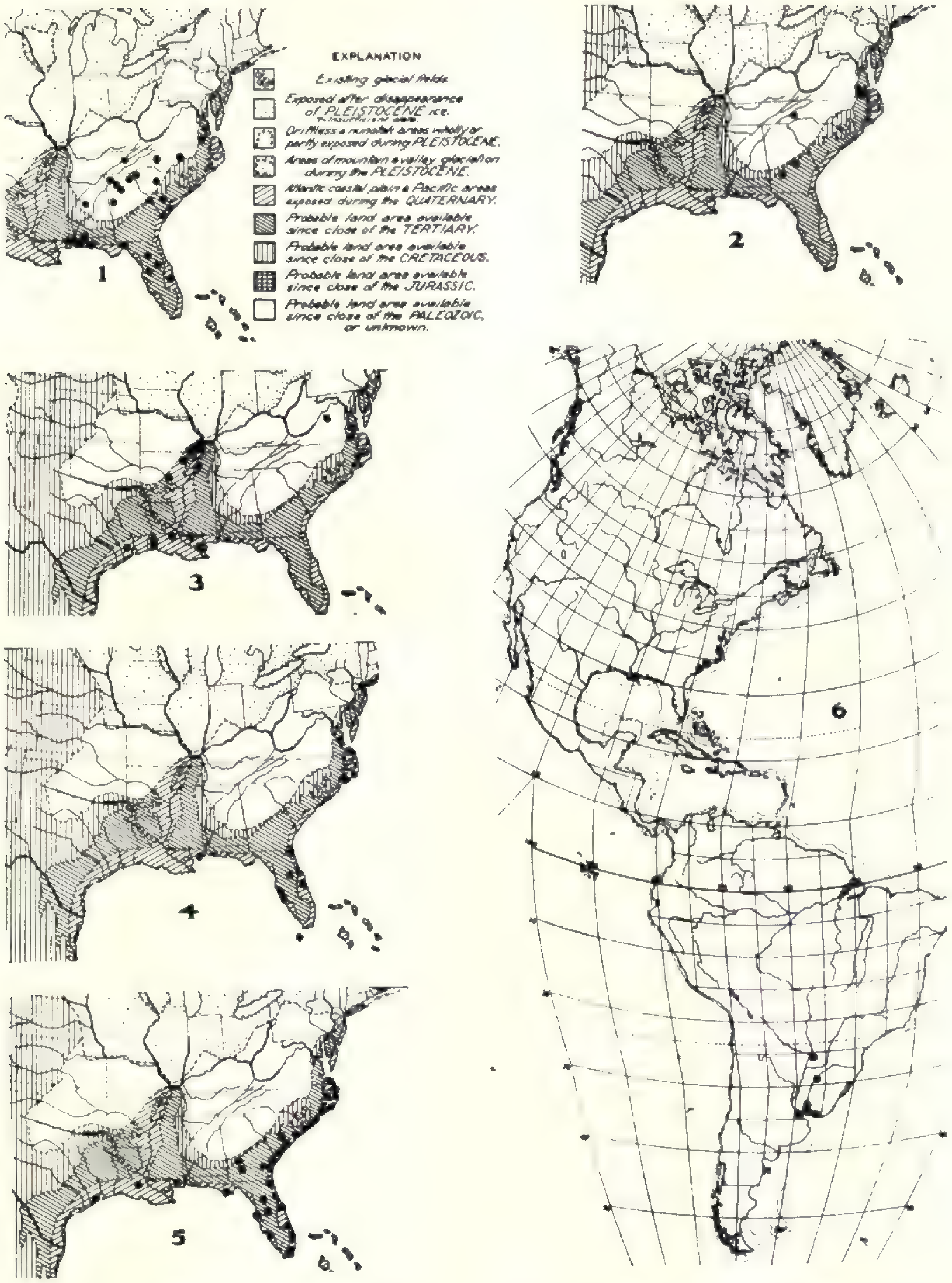
We did not reach any of the landings on the Blackwater that afternoon. The familiar black clouds were assembling in the north and west, ominous thunder was increasing and we, obviously, must get out of this "poor road" before the next cloudburst. But the continuous white sand, with forest dominated by Catesby's oak, *Quercus laevis*, and by *Q. cinerea*, with longleaf pine (*Pinus palustris*) quite evident, with *Carphephorus bellidifolius*, *Scleria nitida* Willd. and other pine-barren specialties everywhere, it was obvious that at last and at the last moment of our last day of the June trip we had unwittingly

[6] Rhodora, xxxix. 360 (1937).

stumbled upon the "powerful lot of right smart sand" which we had been missing for four years. The pine barrens of southwestern Nansemond occupy more than 12 square miles and they could not be investigated until the July trip.

On our July trip (12–28) old problems also had to be looked into. In 1936, on the bottomland of the Nottoway at Cypress Bridge, we got two small individuals which were not quite typical of *Lysimachia radicans* Hook., primarily of the Mississippi basin. We needed material collected through the season and showing all variations. So, on July 17 we went to Cypress Bridge to start a series of monthly inspections of the plant. At the original station freshets had apparently wiped it out, but at the western end of the bridge the plant, in flower, was abundant about cold spring-heads, thence extending far out into the submerged borders of the bottomland. Collections then made, with others up to late autumn, show it to be good *L. radicans* (MAP 3), with considerable leaf-variation, but the plant, which fruits in the Mississippi basin, was here all sterile, whether because too thoroughly drowned or because of its efficient vegetative reproduction we cannot say. Another year, if flowering freely above high-water mark, it may produce fruit. Although *L. radicans* (*Steironema radicans*) occurs in Virginia, I am unable to locate any specimens from other Atlantic states. Its chief development is along the lower Mississippi Valley. This characteristic isolation in Virginia is one which no longer surprises us. With it was a *Galium* which puzzled us. Its fruit and foliage-form were those of *G. obtusum* Bigel., a species ordinarily with whorls of 4 leaves. The Cypress Bridge plant was producing 5 and 6 leaves at the primary and some secondary nodes. This was hardly regular, but flowering material, collected in June, 1940, shows the corollas of *G. obtusum;* we will leave it at that.

For some years we had looked suspiciously at the group of *Rhynchospora cephalantha* Gray and *R. microcephala* Britton. The latter is common in peaty soils of southeastern Virginia, the former rare and confined to sphagnous bogs. But that is not all. A third plant, also rare, somewhat like *R. microcephala* but clearly different, had been found; and in drowned peaty hollows and margins of pools there is a fourth, very much coarser than any of the others. It was now blooming and we made a point



MAP 1, Range of TETRAGONOTHECA HELIANTHOIDES; 2, of ISOËTES ENGELMANNI var. CAROLINIANA; 3, of LYSIMACHIA RADICANS; 4, of AMMANNIA KOEHNEI; 5, of JUNCUS MEGACEPHALUS; 6, bicentric Range of LILAEOPSIS CAROLINENSIS.

of securing it, with the hope that its anthers might give good characters. Since my student, Miss Shirley Gale, had for two years been closely studying and monographing *Rhynchospora*

in North America, I asked her help on this problem. Our results will be included in Part II.

One rainy and dreary morning (the 19th), disliking to spend the day, when identities of plants are so disguised by mist and loads of rain-drops, upon an open habitat, we reasoned: since we are bound to get soaking wet and it is a dismal day, why not tackle the Great Dismal Swamp? Accordingly, in the afternoon, at the lumber camp of the Camp Lumber Co., southeast of Suffolk, we followed the lumber-road into the Swamp. As we already knew, the forest and its flora are essentially those of many large flooded swamps and pocosins or dismals in southern Virginia. However, *Ilex coriacea* (Pursh) Chapm., which we had met nowhere else, is there, and we were particularly pleased to make its acquaintance and to see how really different it is from *I. glabra*. In October the contrast became emphasized, for, whereas *I. glabra* retains its hard drupes through the winter and is used as a Christmas green, the drupes of *I. coriacea* in October were soft and pulpy and most of them had dropped. Only by long search could we find any branchlets with drupes still intact. A smooth-leaved *Persea* interested us and I had a vain hope that we had at last found *P. Borbonia*, but it is not that; in outline the leaf is similar to that of the pubescent *P. palustris* (Raf.) Sarg. Later in the season we secured it also in wet depressions of the pine barrens of western Nansemond. Its identification must await further study, for the material of the group from most American herbaria is now buried in Holland, where, long before the war, it was sent on loan.

On our second trip to the region of Taylor's Millpond we returned to Fontaine Creek, where the bottomland woods are near the northern limits of some species. We were quite unprepared to find them the extreme southern limit of any range but in one recently cut area there was a good colony of the northern *Lactuca canadensis* var. *longifolia* (Michx.) Farwell,[7] heretofore known only farther north or inland, from Quebec to Saskatchewan, south to New England, New York, the upland of North Carolina, Ohio, Indiana, Missouri, etc.

We had found, when we had only a fragment of the day free for botanizing, that the waste places, dumps, neglected road-

[7] See Fernald, Rhodora, xl. 481 (1938).

sides and the railroad yards (especially that of the Norfolk and Western at the eastern margin of Petersburg) supplied some novel weeds; furthermore some weeds, rare or scanty in 1938 or 1939, like *Potentilla recta* and *Chondrilla juncea,* have in 1940 become very abundant and aggressive. So, on the 21st, having only the forenoon clear, we set out to weed the town. Botanically, if not economically, the operation was successful and we brought back a large series of weedy Euphorbias, including the southern *Euphorbia prostrata* Ait., which had been known in the state only through collections of Grimes's. *Acalypha ostryaefolia,* very distinct and almost handsome, abounds on steep weedy slopes near the Appomattox but along the Norfolk and Western, where it might have been indigenous, but too doubtfully so, since, except for a somewhat shaky record for New Jersey, it is otherwise known in the Atlantic States, from South Carolina southward, primarily as a weed. On one open and weedy patch there was a tall amaranth, with prolonged but much interrupted spiciform inflorescences. This proves to be *Amaranthus Torreyi* (Gray) Benth., a western prairie type, a species which may soon abound about Petersburg.

Our earliest Virginia work, from 1933 to 1935, centered on Virginia Beach. We then became very cognizant of the strong contrast between the flora of the open shore and marshes from Cape Henry to Sand Bridge and the western side of Back Bay and that of the eastern shore of Back Bay and the islands (Knott's Island and Cedar Island, the only ones formerly visited). Along the mainland shore or on the west side of Back Bay several species occur which we did not see on the islands and the eastern shore of the Bay. Conversely, there are many species on the islands or at False Cape which we have never found on the west side of the Bay. Thus, along the shore or on the sands between Cape Henry and the inner shore near Munden the following, among others, are characteristic, yet we have never got them from the outer shore of the Bay or from the islands: *Aristida lanosa, Cyperus retrorsus* var. *Nashii* (Britton) Fern. & Grisc., *C. erythrorhizos, Fuirena pumila* Torr., *Xyris difformis, Tillandsia usneoides* (on trees), *Sesuvium maritimum, Nelumbo* and *Heliotropium curassavicum.* On False Cape or Cedar Island the following, unknown on the mainland side of the Bay, we knew

to be characteristic: the austral *Phalaris caroliniana* Walt. and *Eleocharis albida;* the boreal *E. halophila* Fern. & Brackett; and *E. Lindheimeri* (Clarke) Svenson at the only known coastal area east of Texas; the southern *Dichromena colorata* and *Juncus megacephalus;* and the remarkable *Iresine rhizomatosa* of the Mississippi basin and southwestward but with another isolated area on the Potomac; and *Ampelopsis arborea* and *Lippia nodiflora.* These contrasts indicated that the islands of Back Bay need much more exploration by competent botanists. Consequently, when that energetic and successful champion of conservation of the flora of Cape Henry, Miss Sally Ryan, invited us to her home at Virginia Beach and asked me to suggest some area where we could do worth-while botanizing, I suggested securing a motor-boat and getting out to the islands.

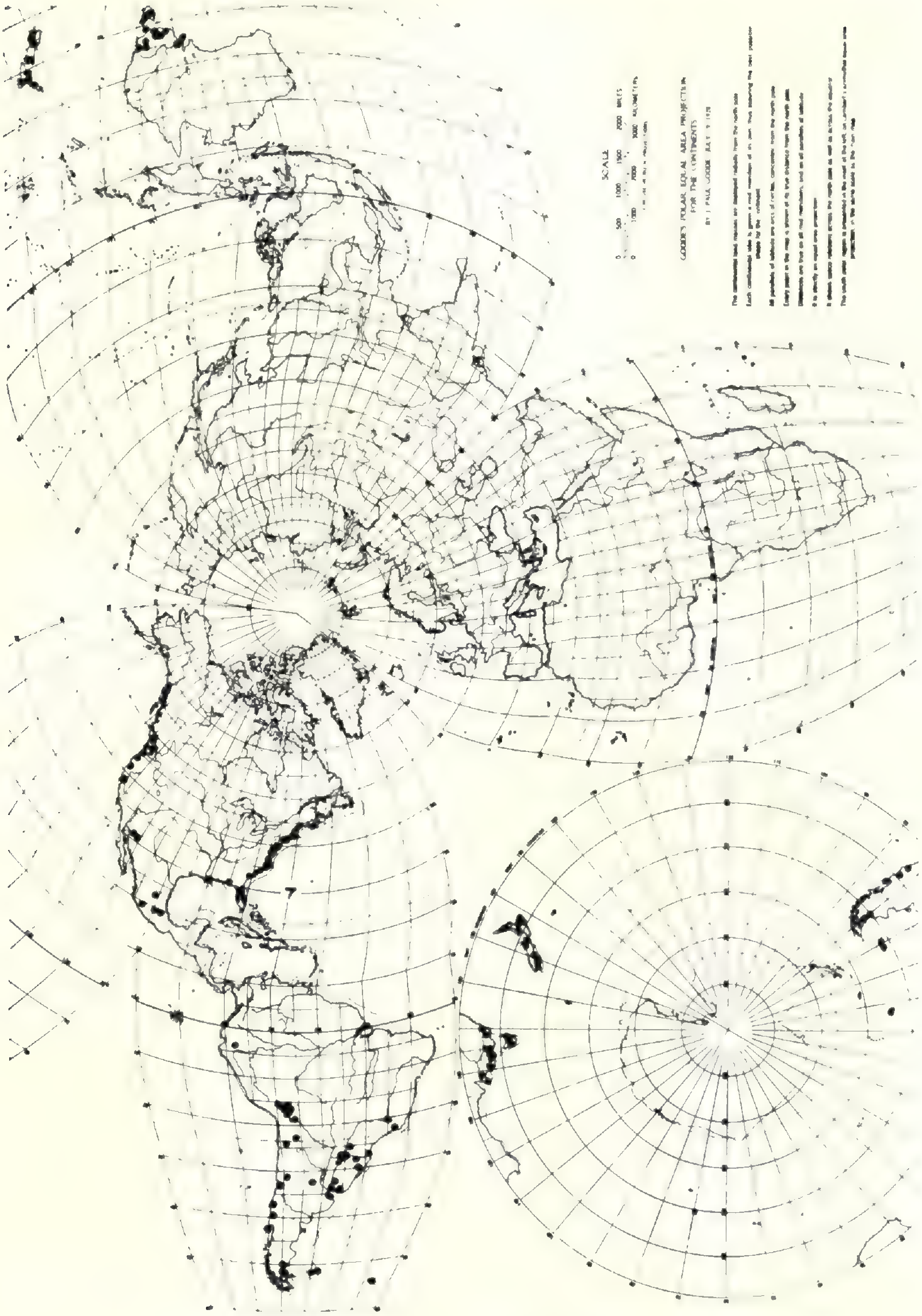
On the 22nd, therefore, with Miss Ryan's co-worker on conservation, Miss Mary Leigh, my correspondent for some years, and with Mr. George Mason, Director of the Mariners' Museum at Newport News, we drove to the headquarters (C. C. C. camp) of the National Wildlife Refuge at Pungo. The friendly Manager of the Refuge, Mr. Harry A. Bailey, with his associate, Mr. Ewell, a native of the region, drove us down the beach to the developing headquarters of the Refuge, back of and below Little Island Life Saving Station. Thence we were taken in one of the splendid launches of the Biological Survey by Mr. Ewell to the southeastern corner of Long Island, and he waited patiently among the mosquitoes and flies for some hours while we waded along the marshy margin of the Island. Before we had left the plank-walk leading from the landing at the outer border of the marsh we wanted to jump in, to get the rare plants which were in sight. *Najas guadalupensis* and *Anacharis occidentalis,* flecked with *Lemna perpusilla,* filled the water; *Ammannia Koehnei,* MAP 4 (represented in our larger herbaria from only a few stations between Florida and the Hackensack Marshes), was in solid phalanx, and the white and lilac-tinged flowers of the sub-tropical *Bacopa Monnieria* and the panicles of the local marsh grass, *Diplachne maritima* Bicknell, were conspicuous. We waded at the inner margin of the marsh (in fresh water, we were assured, but with a remarkable number of halophytes, like *Scirpus robustus, Spartina cynosuroides* and *Lythrum lineare*)

through shoulder-high and taller vegetation. Progress was slow and difficult but we wanted to go slowly in order to see the plants. Amidst the commoner marsh species there were limited colonies of *Dichromena colorata* and of *Juncus megacephalus* (MAP 5) which we had known in Virginia only at False Cape, the latter following the coastal marshes northward, but in the southern half of its range venturing inland, and unmistakable *Verbena scabra* Vahl, a tropical species which we already knew as an excessively local plant in eastern Virginia. At the border of the marsh, beneath the bushes, *Carex Frankii,* an inland species, had reached the coast, although we had never before met it in Princess Anne County; and farther back, just as on Cedar Island, the Mississippi basin *Iresine rhizomatosa* abounded, and *Physalis angulata,* the first we have had in the Gray Herbarium from north of North Carolina, was occasional. We were approaching the small pond back of the marsh and south of the landing, and Mr. Ewell was in sight, coming to say that it was time to leave, for it was important to get back to Little Island in order to take advantage of low tide in driving up the beach. It was necessary, however, to see what was in the pond. It is fortunate that we did so, for this pool contains a continuous carpet of closely interlocked plants of *Lilaeopsis carolinensis* Coult. & Rose (MAP 6). *Lilaeopsis,* a very primitive genus of the *Umbelliferae,* without true leaves but with clavate or broadened and jointed stems functioning as leaves, has one species on tidal shores of Atlantic North America from Florida to Nova Scotia, another on the Pacific coast from California to British Columbia, others (very local) in Arizona and Mexico and the others (except *L. carolinensis*) local species of various parts of South America (tidal shores to more than 4000 m. in the Andes), Tasmania, New Zealand and Australia. The antiquity of the genus (MAP 7) is evident; and at the last moment on Long Island we were pulling in mats of *L. carolinensis.* Described in 1897 from a single collection from eastern North Carolina (presumably near Wilmington), it is now known from three other stations in North America: Horry Beach, South Carolina; New Orleans; and our new station on Long Island. But along La Plata River in Argentina, Uruguay and Paraguay it is evidently frequent. *L. carolinensis* is clearly a bicentric species, with one area in warm-temperate

eastern South America, there reaching its southern limit near lat. 35°, the other area in warm-temperate eastern North America, with the northern limit near lat. 36°. Such ranges will find amplification when we consider other plants of fresh tidal waters and marshes collected in the late summer and autumn of 1939.

We were deeply grateful to Miss Ryan for having arranged so successful an expedition and to all our new friends who had helped her carry it through; but she and Miss Leigh, with the remarkable enthusiasm which they share, were not through for the day. When we reached headquarters near Pungo, although we had already had a long day and were soaking-wet, they offered to show us some of the specialties; but, since none of the party had ever seen *Asarum arifolium*, which Griscom and I had found in May, 1935, in woods near Creeds, we went in search of that. The station seems to have gone with its protecting forest. After that the ladies introduced us to their station for *Stewartia Malachodendron* and took us to other interesting plants. When, after dark, we brought up at a fashionable restaurant for late dinner, the well-groomed official haughtily looked us over and shook his head. After demonstration that we were more respectable than our bedraggled clothes, we were ushered into a secluded room and allowed to eat where the sporting fraternity of Virginia Beach would not be shocked. Long and I were dead-tired when we reached the Ryan home; the ladies could have stayed up all night, going over the specimens!

Next morning we drove, not too far away, in the vicinity of the Beach, for Long and I had to catch a noon train at Norfolk. Having heard that the area of sphagnous peat south of the Rifle Range was greatly altered and that deep ditching had obliterated the only known station in the world for the unique cleistogamous *Hypoxis Longii* Fernald in Rhodora, xxxvii. 410, pl. 393 (1935), both Long and I, as responsible for its original recognition, were anxious to know its fate. Since the discovery of the plant the Rifle Range has been greatly altered and, whereas we used to go and come at will in the region to the south, the area is now fenced off and with military guard, for not only rifle-practice but mortar-firing and other military training have greatly increased. The Commandant, as soon as I explained my errand,



Map 7, Range of Genus Lilaeopsis.

most kindly let us pass, with the precaution to be back before mortar-firing; and in five minutes we were standing in the original station, with *Hypoxis Longii* seemingly as prosperous as ever.

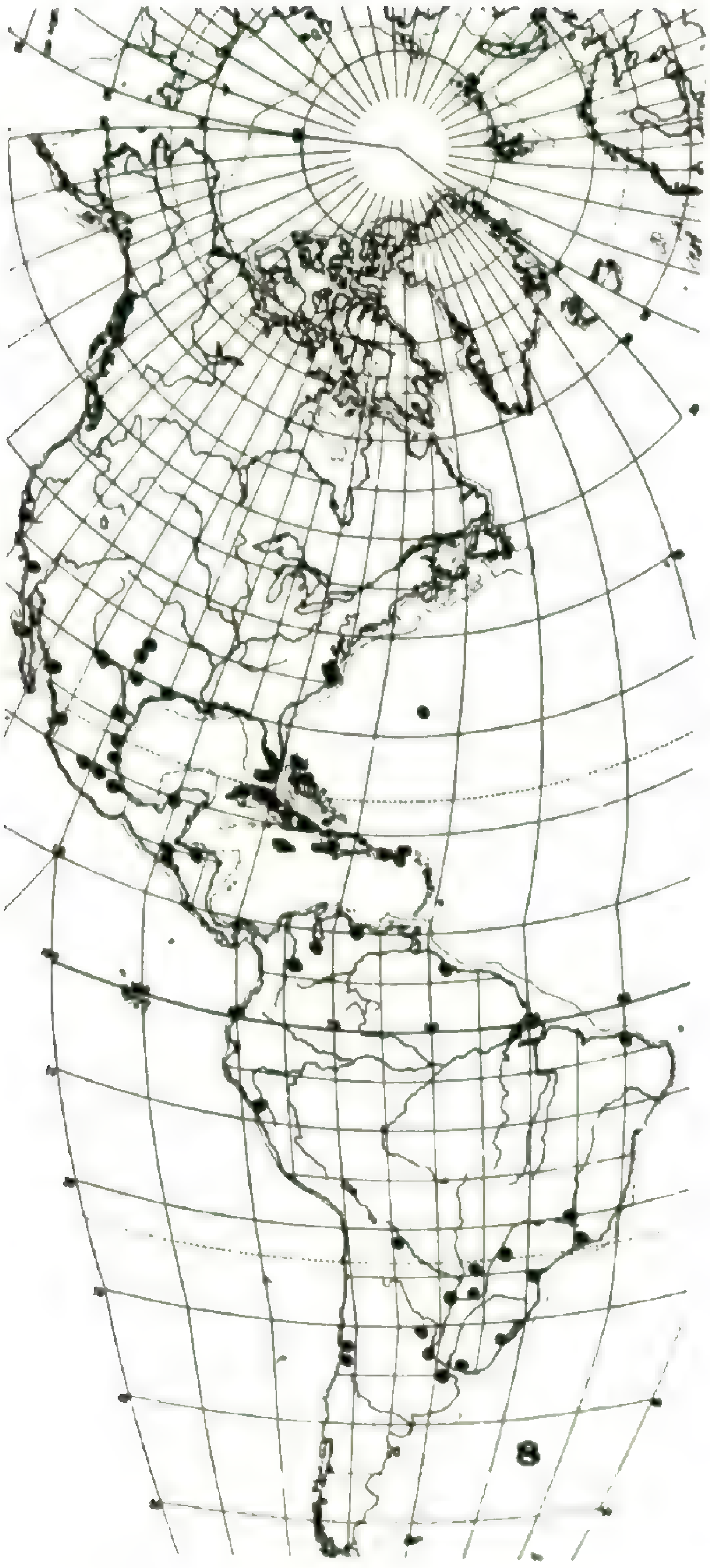
This species, descended from the ancient stock (of subgenus *Ianthe*) which left representatives in New Zealand, Australia, Tasmania and South Africa and *H. Longii* and *H. sessilis* L. or their progenitors in eastern America, has not given up merely because of temporary change. It is, however, too near the military developments which are rapidly moving toward it and it is fortunate that it was discovered and collected when it was.

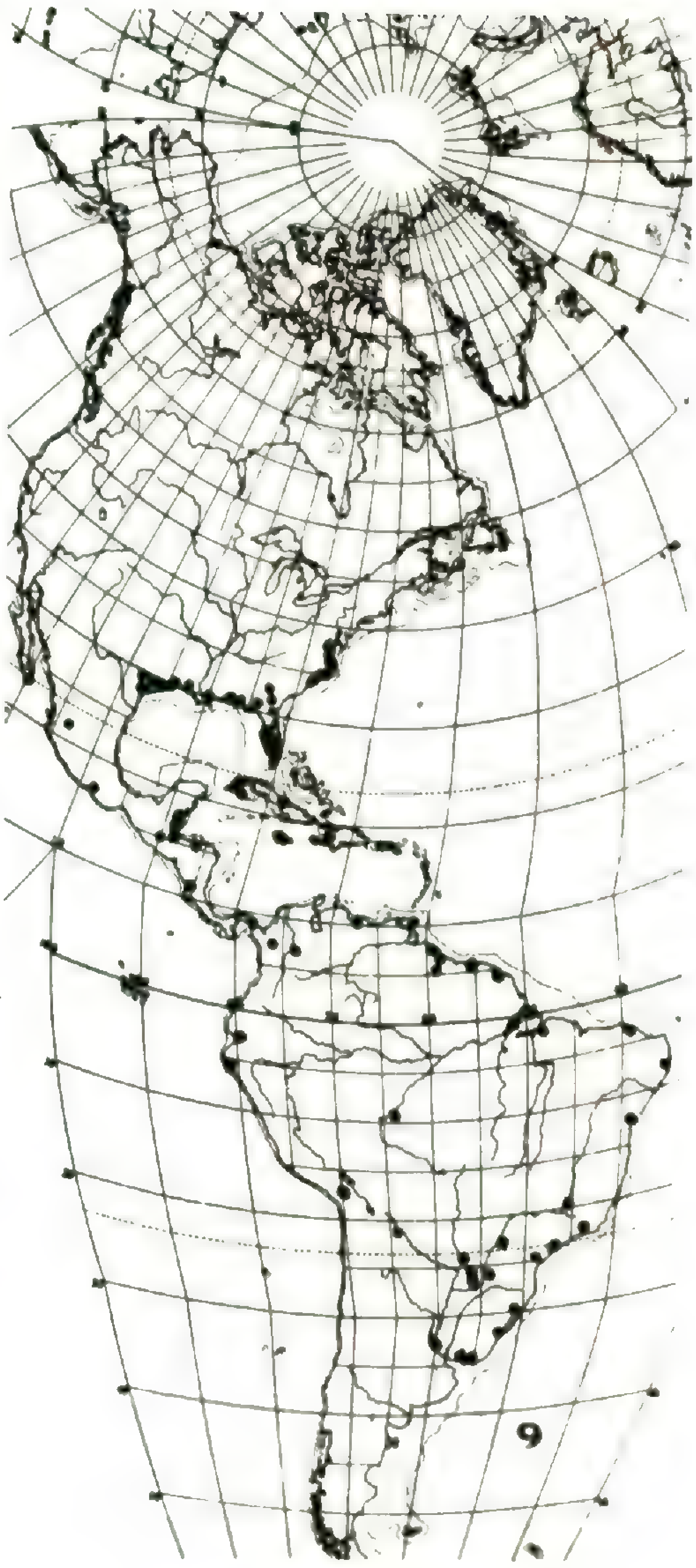
We then went to Dam Neck, where in May, 1935, Griscom and I had found a single plant of the other American member of *Hypoxis*, subg. *Ianthe* (*H. sessilis*), hoping that the cattle, which then infested its habitat, had moved on. The cattle were not there but, so far as we could determine after an hour of back-breaking search, neither is *Hypoxis sessilis*. As a last episode, Miss Ryan took us to her station for *Osmanthus americanus* (L.) B. & H., a southern tree isolated at northern stations back of Cape Henry. It was a joy to see it with our own eyes, but there was hardly time to drive to another station for it, discovered by Miss Leigh.

On the way to and from Norfolk on the through train we had caught flashes which we took for *Sarracenia flava* and for *Zigadenus glaberrimus*. These meant possible good bogs. So, on the 24th we drove down the line (parallel with the Norfolk and Western) to investigate them. For the most part they are meagre remnants with nothing notable; but 2 to 2½ miles west of Waverly there is a rather nice and very typical patch of swampy woods, with *Zigadenus glaberrimus* in such profusion as we had never imagined. Returning to the car, which was parked at a minor cross-road, we were surprised to find the ditch full of *Typha truxillensis* HBK. (MAP 8), the tropical species reaching the shores of Back Bay and discussed by me in 1935. The Back Bay stations were the first known north of Florida, and the *Typha* there extends north to latitude 36° 40′. The station in Sussex County is 65 miles inland and in latitude 37° 2′. Another plant at this crossing was new to us. Occupying the railroad embankment, so suspiciously close to a farm-gate as to suggest that it had started from seed brought in freight delivered there, it has become an extensive colony. It proves to be *Froelichia gracilis* (Hook.) Moq., native from Iowa to Arkansas and southwestward. We were quite excited over it, but next day we

found it also in the Norfolk and Western yard at Petersburg, and in 1940 in similar places at Richmond.

The sphagnum bogs along the Norfolk and Western mostly proving of no interest and we being much overheated after some miles of tramping along the tracks, we decided to start home and, if opportunity presented itself, to do a little exploring. We had many times noticed a road leading north from Disputanta to Newville and since exploration and relatively cool riding were in order we took that. Yellow-rayed composites were becoming frequent and we had more than once chided each other for calling a halt at colony after colony of familiar species of *Coreopsis* or *Rudbeckia*. At the border of pine and oak woods, however, something failed to "register", so I risked being laughed at and called to Leonard to stop; there was a strange yellow composite in the woods. Although we had passed the original spot, there was no need to go back; the border of the woods for a mile or two was full of the strange plant. Only a few heads were expanded and we were not sure of the genus; in August the woods-border was brilliant with the fully developed heads and then we enjoyed the real beauty and distinction of the plant. We even guessed it to be a strange *Heliopsis*, but it proves to be *Rudbeckia Heliopsidis* Torr. & Gray (MAP 10), described, with two varieties, "*a.* almost glabrous" etc., and "*β*. . . . pubescent", from "Pine woods, &c. *a.* Columbus, Georgia, *Dr. Boykin!* *β.* Cherokee country of Alabama, in wet places, *Mr. Buckley!*" It has not been found in other regions and most of our herbaria lack the species. They will now be well supplied, and roots of the species wintered successfully in the Harvard Botanic Garden, whence seed can later be sent out. Furthermore, the Disputanta area has both the glabrous and the pubescent forms. Carl Mohr in his *Plant Life of Alabama* says of it "Local and rare" and found only in the "Mountain region" of Cherokee, Lee and Dekalb Counties. This disruption of range inevitably calls to mind the Cherokee Gentian, *Gentiana cherokeensis* (W. P. Lemmon) Fernald in RHODORA, xli. 487 and 552, map 14 (1939), which is known only from northwestern Georgia and from wet pineland of Sussex County, Virginia. These ranges are also suggested by *Isoëtes Engelmani* var. *caroliniana* (MAP 2), already discussed, and by one of the very rarest of Trilliums, *Trillium lanceolatum*





Map 8, Range of Typha truxillensis; 9, of Cyperus haspan var. americanus.

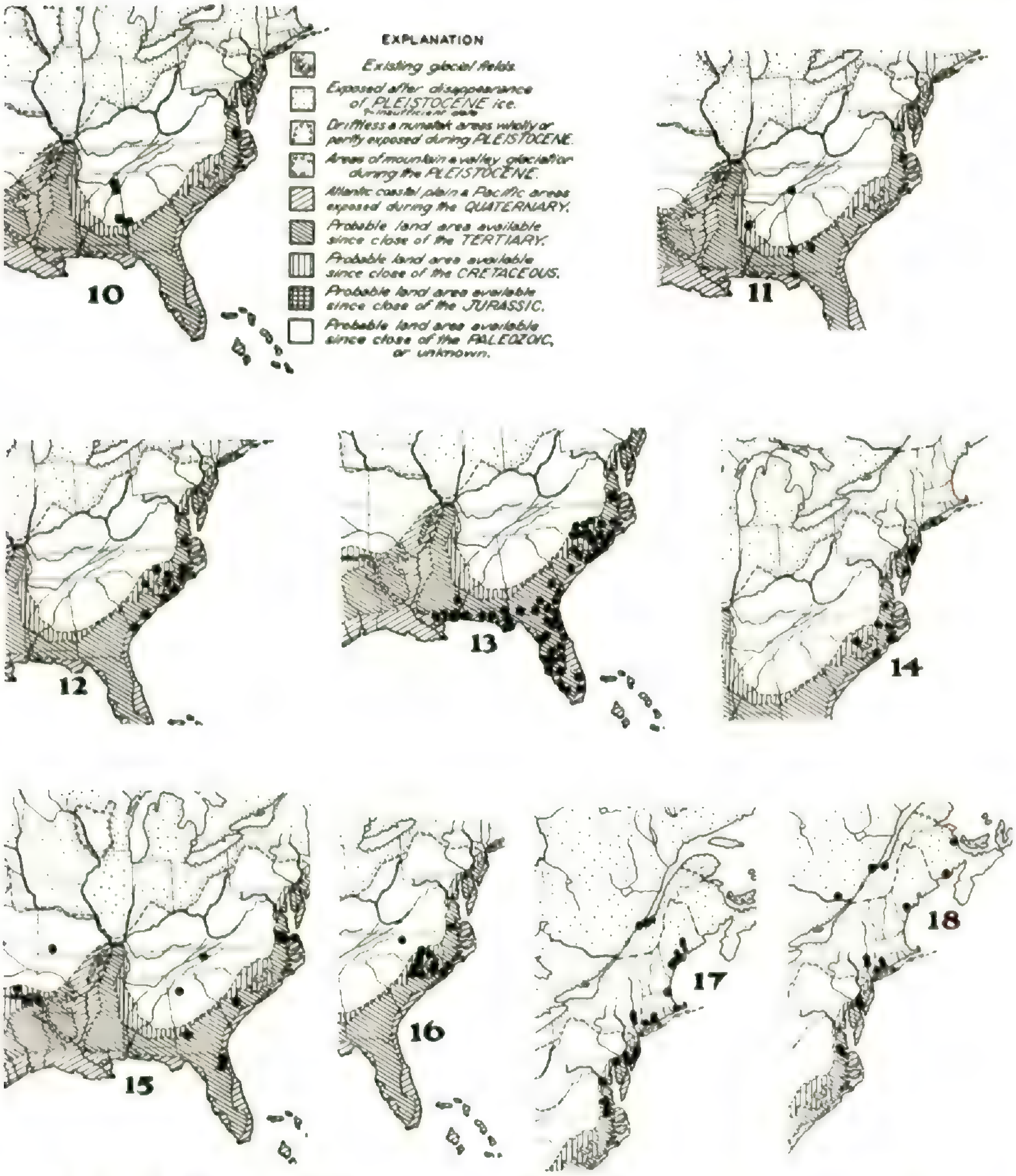
Boykin (map 11), which was collected in late April, 1926, by Professor Paul A. Warren, in the Great Dismal Swamp, when a party from the College of William and Mary went from Walaceton to Lake Drummond. Up to 4 P. M. we had considered the day a "flop"; at bed-time we regarded it with complete satisfaction!

The next day was really a "flop". Aiming to cross the James from Scotland to Jamestown and to investigate back roads in that region, we got to a point between Surry Courthouse and the Scotland Ferry; then the car stalled. Towed back to Surry

Courthouse for repairs, we spent the day there. After lunch there was little to do except to wait patiently for the repairs and to look over the weeds of back yards and roadsides. Two weeds, *Potentilla intermedia* and *Rumex Acetosella* var. *integrifolia* Wallr., we had never met in the state, but on the whole the pickings were few. Naturally the people of the county-seat were curious about two strangers who constantly looked down and suddenly stooped at roadsides or in waste lots and grabbed at something; and when Long ventured to clean the mosses off trees and basements in the court-house precincts, the admiration and wonder increased. Upon his explaining the interest of such studies he received the judicial reply: "Well, a grass is a grass, a moss is a moss; that's all we know about it". Forty-eight hours later, in a more humble locality, we stimulated a quite different comment.

Next day, reasoning that the pine barrens of western Nansemond County must by this time have warmed up and come well into bloom, we went there. Taking the first sandy road toward the Blackwater River, below South Quay bridge, we reached George's Bend. Wishing to park our car in the yard of the isolated house above the river, we at first met some dissent from the owner; but, as soon as he knew our errand and that we were not after his fish, he and his alert wife proved most cordial and valuable new friends, for he was Mr. T. S. Jones, long employed in surveying, and it was he who had located the colonial landings and worked out their history in the preparation of the contour-sheet of 1918. Mr. and Mrs. Jones were so hospitable and so full of lore about the Blackwater valley and its history that we almost forgot that we came to botanize. However, going down to the river and following south toward the old (or original) South Quay, we found ourselves in such a forest of *Styrax americana* as we had never imagined. Along the Nottoway, below Point Beach, we had been amazed at the profusion and size of the small trees, but the colony between George's Bend and old South Quay is scarcely to be excelled; and *Asimina parviflora* (Michx.) Dunal, elsewhere scattered, was here really abundant.

Returning to the main "poor road" southeastward, we next left it to go down to Milk Landing, but we did not stay long, for



Map 10, Range of Rudbeckia Heliopsidis; 11, of Trillium lanceolatum; 12, of Vaccinium crassifolium; 13, of Calopogon pallidus; 14, of Rhynchospora pallida; 15, of Triodia Chapmani; 16, of Zenobia pulverulenta; 17, of Eriocaulon Parkeri; 18, of Elatine americana (omitting far-inland records).

my two companions promptly got into a nest of "seed ticks", literally thousands and thousands of the tiny vermin. In a few seconds they were peppered, resembling old-fashioned pictures of the worst eczema-cases, with the minute irritating specks. An hour off was necessary for them partially to clean up; and Milk Landing was carefully avoided for two months and became the object of uncomplimentary remarks whenever we drove by

the road. So, leaving that infested area, we went on and took the partially overgrown road leading southward, parallel with the river. We soon came to an overflowed branch, too much swollen to cross, and parking the car off the narrow road, we went on afoot. In five minutes we were in such a pine barren as we had not imagined. In fact, we did not get to the road leading down to Cox Landing that afternoon. The daily thunder-storm was upon us, with vivid lightning and claps of thunder which could mean only that lightning had struck near-by. Finally, returning to the car, we saw a tall pine shattered within ten feet of the parked car; that meant that it was time to start home. For three days we explored this area and I shall make no effort to follow exact chronology in enumerating the specialties. Sharing the damp sands and peats with *Pyxidanthera* were solid carpets of a trailing evergreen *Vaccinium,* somewhat suggesting cranberries but with axillary young fruits. This could be nothing but *Vaccinium crassifolium* Andr. (MAP 12), a very local Carolina species heretofore unknown north of central-eastern North Carolina. There are many square miles of it here; we found it to the east, nearly over to Marsh Hill School; and in May, 1940, stretched its range northward into Isle of Wight County. That was a good start! Practically all open and damp areas were full of *Juncus abortivus* Chapm. and *Rhynchospora distans* (Michx.) Vahl, both found by us in 1936, growing together in one small patch in the Isle of Wight barrens south of Zuni; the sands were a seemingly continuous carpet of *Xyris flexuosa* (*arenicola*); and *Bulbostylis ciliatifolius* and *Tradescantia rosea* Vent. var. *graminea* (Small) Anders. & Woodson, along with *Panicum mutabile* Scribn. & Sm., were in the drier sands. At one point Long detected tiny seedlings of a plant which resembled *Polygonella articulata;* but, since we had never found that species (common farther north) in Virginia, we fondly hoped that in October it would prove to be some rare southern species. *Seymeria cassioides* (Walt.) Blake, also of the Isle of Wight barrens, was there, as were the two Sarracenias, along with *Rhexia ciliosa.* In the bushy hollows, among the common but always beautiful *Lyonia lucida, Leucothoe axillaris, Smilax laurifolia, Cyrilla racemiflora* and other characteristic austral shrubs, there was one colony of a tall *Amelanchier* with most of

the leaves entire. Unfortunately, it was too late for fruit and in April, May and June of 1940 we could find neither flowers nor fruit. Here, too, was the glabrous-leaved *Persea* which we had seen in the Great Dismal Swamp. *Chamaecyparis thyoides* often filled the hollows and in many depressions there was a characteristic *Hamamelis*, with twigs quite pubescent, the relatively small leaves heavily felted and mostly with a silvery tone beneath. This greatly interested us and we followed up the colonies until, in October, we had the newly expanding flowers. It is *H. virginiana* var. *parvifolia* Nutt., originally described from the mountains of Pennsylvania and from Louisiana. Long and I used to get it in Nova Scotia, but south of New England it is apparently highly localized. *Cleistes divaricata* (L.) Ames is scattered in the thickets, but the great prize in the orchids was *Calopogon pallidus* Chapm. (MAP 13), a beautiful little species new to the "Manual range"; but already known within 90 miles of Virginia. The map, generously supplied me by Dr. Donovan S. Correll, clearly brings out the gap between the northeastern stations in North Carolina and the isolated area in southeastern Virginia. So many southern Coastal Plain species extend northward to the Neuse or occasionally to Pamlico Sound and then vanish, to reappear again in southeastern Virginia, that we can only conclude that northeastern North Carolina really lacks them or that its assumed sterility has prevented proper search for them. My North Carolina friends tell me that the former is the right interpretation. So much for the general area of pine barrens.

Wishing to get to Sandy Landing, Cherry Grove and Wyanoke, but hoping to find a road with fewer overflowed branches, we drove one day down the Factory Hill road and took a side road southwestward below Marsh Hill School. Two years earlier, with a driver whose bent was not exploration, we had started out this route but had soon turned back because the road was so bad. Now it seemed almost a boulevard. Passing the clearings and farms, we soon came into pineland and, reaching Big Branch, we saw that it was the deepest one yet. I tested the crossing until the water was nearly up to my hips, so this route to Sandy Landing would not do in the rainy season. Backing up from Big Branch to turn, we suddenly realized that, intent upon map

and road, we had just passed a wonderful sphagnous savannah-like swale, such as we had never before seen in Virginia. Parking near the house of the colored farmer, Tom Hunter, who, with his brother on the clearing beyond, has the satisfaction of being without neighbors for some miles to the north or south, and for more than a mile to the west, east and northeast, we proceeded to explore. Much of the original bog had been cleared and turned into corn, beans and peanuts, but there were remnants which showed what a wonderful spot it originally was and, to a slight extent, still is. Melanthaceous and more typically liliaceous species vied with orchids and unusual sedges for possession. The place was brilliant with the purple racemes of fruiting *Tofieldia racemosa.* Dozens of leaf-green fruiting racemes of *Amianthium Muscaetoxicum* could easily be counted; and a regular army of creamy-white panicles of *Zigadenus glaberrimus,* with purple panicles of *Melanthium virginicum,* was at the upper border of the area. Orange-flowered *Habenaria cristata* and white *H. blephariglottis,* by thousands and larger than we usually see, were splendidly flowering; and with them there was a single ×*H. Canbyi,* their hybrid, heretofore unknown from Virginia. Beyond the *Zigadenus* patch we suddenly halted, each of us excitedly calling to the other to look, for there were great erect orange-red flowers of a lily. Obviously related to the more southern *Lilium Catesbaei,* it is larger in all parts, with broader and less recurving petals, broader and blunter leaves and other characters which set it apart, and in October, when we collected ripe fruit, we found that it has distinctive capsules and seeds. It is undescribed but will be fully discussed and illustrated (PLATE 632) in Part II. Seeds have been given to several growers of lilies and the seedlings at the Harvard Botanic Garden are prospering. In the wetter areas among nice associates, *Lachnocaulon anceps* was thriving; and, scattered over the bog, there were many choice sedges. Space will be taken to mention only two. *Scleria minor* (Britton) W. Stone, always a very satisfying species of wet sphagnum, abounded; and there were gigantic clumps (up to a foot in diameter and 3½ feet high) of *Rhynchospora pallida* (MAP 14), the tallest specimens ever collected and the first evidence of this truly rare species with bulbous-based culms between Beaufort County, North Carolina, and its local

station in Delaware. We had, indeed, been having several "peppy" half-hours.

Before we quit, Tom Hunter, the colored owner, returned from Franklin. Already informed by his flock of children as to our visit, he greeted us: "I'm glad that someone who knows plants has come in here; there are lots of them here that I don't know about". So I opened my box, which happened to have fruiting *Persea* at the top. "Ah! Red Bay!" was the immediate response, followed by the question, "Have you found the Polypody that grows up in the trees?" Two days before, at Surry Courthouse the best we could draw from the rulers of the land was, "Well, a grass is a grass, a moss is a moss; that's all we know about it"!

In August (17–30) we first went to the wet pineland at Colliers' Siding, south of Petersburg, where one of the new Rhynchosporas abounds, along with *Rhynchospora perplexa* Britton, hoping to find *Manisuris* which *ought* to be there. It certainly is not there! But in crossing the tracks of the Atlantic Coast Line we got one tiny individual of a rubiaceous plant new to us. Eye-straining search among the weeds for half-an-hour showed no more. We, accordingly, accurately divided the tiny plant, scattered the ripe seeds and recorded the tropical weed, *Richardia scabra* L., as having barely reached Virginia. We then went to Disputanta to get fully flowering material of *Rudbeckia Heliopsidis.* While doing so we found the northernmost and really quite extensive station for *Lilium Michauxii* Poir. Then, having an hour left before dark, we went exploring, this time to Indian Point on the James. There we found very rich slopes which, in spring, must be full of interest; and one species in old fruit, *Viola striata,* was definitely an addition to the Coastal Plain flora. It belongs primarily in the richer interior.

Next day, exploring and somewhat lost on back roads between Stony Creek and Emporia we were approaching Double Bridge on the Nottoway when *Helianthus decapetalus,* which we had not had on the Coastal Plain, caught our attention. Stopping to collect it we found, just below the fall-line, a rich assemblage of upland types. I had long been worried because in the Gray Herbarium there is an old specimen, called *Sida Elliottii*, without further data than "Petersburg, Va., *Tuomey*". In our four seasons of botanizing, with Petersburg often a center, we had never

seen it, but, in pine woods slightly below the fall-line there was a large colony of the plant in fine flower. Later in the season, above Carey's Bridge, we found the plant very abundant, also in pine woods. Now that we have a full series in flower and in mature fruit, it shows many characters, including conspicuous ones in the carpels. It is an undescribed species (PLATES 638 and 639) and not at all *S. Elliottii.* Slightly above the bridge the "fall-line" is here conspicuous because of the ledges displayed, with a steep cliff at the fall of the river. On these ledges, the common plants both of the Piedmont and of the Coastal Plain, *Woodsia obtusa, Panicum laxiflorum,* etc. were abundant, but it was a real surprise to find, within a few rods of the inner margin of the Coastal Plain, the upland *Cheilanthes lanosa.* We have not yet succeeded in coaxing it over the fall-line. While waiting for the party to assemble I crossed the bridge from Sussex into Greensville County. There, at the end of the bridge (north of Purdy), was a large oak with heavily fruiting branches. In October, when the fruit was ripe, the profusion of acorns upon it was most striking. Yet it proves to be *Quercus Bushii* Sargent, a reputed hybrid of *Q. marilandica* and *Q. velutina,* heretofore recorded only from Georgia and Florida to Oklahoma and Mississippi.

When we returned to Cobb's Wharf for the later stage of *Panicum cryptanthum,* also getting at the tidal shore *Echinochloa Walteri,* forma *laevigata* (*E. longearistata* Nash), new to Virginia, we passed by an extensive and very weedy peanut field. In joke I said, "Let's get some fancy weed out of this field". Leonard stopped the car, and pronto! there was an acre or more of gigantic *Richardia scabra* overtopping the peanut plants, the tropical weed of which we had scrupulously divided a single starved plant a few days earlier! Another day, in Nansemond County, stopping at the border of the road, the first plant we saw was *Richardia.* It has more than "barely" reached Virginia; but something had spoiled the charm. Repeatedly thereafter I tried the formula, "Let's get some fancy weed out of this field", but it never worked again.

Returning to the white sands south of Sebrell we found the clearings and open woods full of critical species of grasses and sedges, but our chief interest centered on *Triodia Chapmani*

(Small) Bush (map 15). Ever since Griscom and I found it back of Cape Henry, we had been watching it. We never have any question about its identity and now we noticed that this plant of pine barren and dry sands has conspicuous pulvini as compared with those of *T. flava.* Our experiences lead us to the conclusion that it is a distinct species, which comes north into southeastern Virginia.

Returning to Tom Hunter's, via the road south of Marsh Hill School, where, in the pineland, fruiting plants of *Cleistes divaricata* were scattered, we found the sphagnous swale much changed in appearance. The brilliant display of color was gone, but the large purple flowers of *Chelone Cuthbertii* were very handsome. Still prettier, from our prejudiced viewpoint, was tiny blue-flowered *Burmannia biflora,* its local range now extended eastward into Nansemond County. The open springy spots had carpets of *Utricularia,* especially *U. juncea* and its tiny imitator, *U. virgatula.* I think I do him no injustice when I state that Long is inclined to look upon them as possible phases of one species, comparable with *U. subulata* and its forma *cleistogama* (*U. cleistogama*). Other such oozy openings were the home of *Psilocarya scirpoides,* var. *Grimesii* Fernald & Griscom in Rhodora, xxxvii. 154, pl. 344, figs. 1 and 2 (1935). The plants were of all sizes, from starved individuals with few spikelets up to relative giants, 6 dm. high.

In the more typical pine-barren area we were delighted with several plants which in July had been unrecognizable. *Eupatorium tortifolium* Chapm. had not been recorded from north of South Carolina, and the range of *Andropogon virginicus* var. *glaucus* Hackel (*A. capillipes* Nash) was extended north from North Carolina. With it was *A. virginicus* var. *tetrastachyus* (Ell.) Hackel (*A. tetrastachyus* Ell.) which Griscom and I had found at Cape Henry. East of Sandy Landing there were many plants, resembling *Carphephorus tomentosus* (Michx.) Torr. & Gray but much smoother and with glabrous rosette-leaves. These could be only the plant described by Elliott from South Carolina as *Liatris Walteri* but not recently recognized, although Ravenel correctly identified material from Santee Canal and M. A. Curtis so named specimens from Wilmington, North Carolina. It is a fine addition to the "Manual range" and will

be further considered in Part II. Another addition to the flora of Virginia, one which tremendously pleased us, is *Zenobia pulverulenta,* a very local species heretofore known only in the Carolinas (MAP 16).[8] In many wet thickets and *Chamaecyparis* swamps, particularly from northeast of Cox Landing to below Sandy Landing, it is conspicuous. In 1939, when it was in fruit, we got only the green-leaved shrub, but in June, 1940, when the beautiful milk-white and delicately fragrant large bells were expanded, we found all shades of foliage, from the deepest green to the bluest white, and great diversity in outline and toothing of leaves. These will be discussed in Part II. It is futile, perhaps, to attempt to discriminate among the handsome members of the tribe *Andromedeae,* but at the moment *Zenobia,* when loaded with flowers, ranks about first in our minds.

At last (on the 22nd) we made the crossing to Jamestown Island and the surrounding area. As soon as we reached Back River, opposite Jamestown, our duty became plain. The tidal marshes were becoming rich botanical ground. Close to the landing there *Aeschynomene virginica* was maturing. A year before we had been thrilled by it and now it was a bit exciting; but from now on through October it was seen on practically every tidal shore of the river-systems from the James northward. *Echinochloa colonum* (L.) Link, which we had never before met, was there, and some other species to be noted in Part II. Doing the obvious, we sought out the fresh tidal marshes of Powhatan Creek and, luckily, we arrived before the tide had too much drowned them, though we finally got driven out before we had completed our survey. That, however, is the disadvantage of work on estuaries, and, strangely enough, low tide on rivers a few miles apart may be at quite different hours. This is especially the case on creeks entering rivers with long distances to the open ocean and with sinuous channels, like the James. In September and October, when we specialized on estuaries, it was necessary to learn the hours of low tide on different rivers and at different points upon them; otherwise we should have failed. We got the impression that the favorite

[8] In the Herbarium of the New York Botanical Garden there is a specimen marked on a copied (not original) label: "High mountains of North Carolina, June, 1868, *Wm. M. Canby*". This specimen is too doubtful for inclusion in the map.

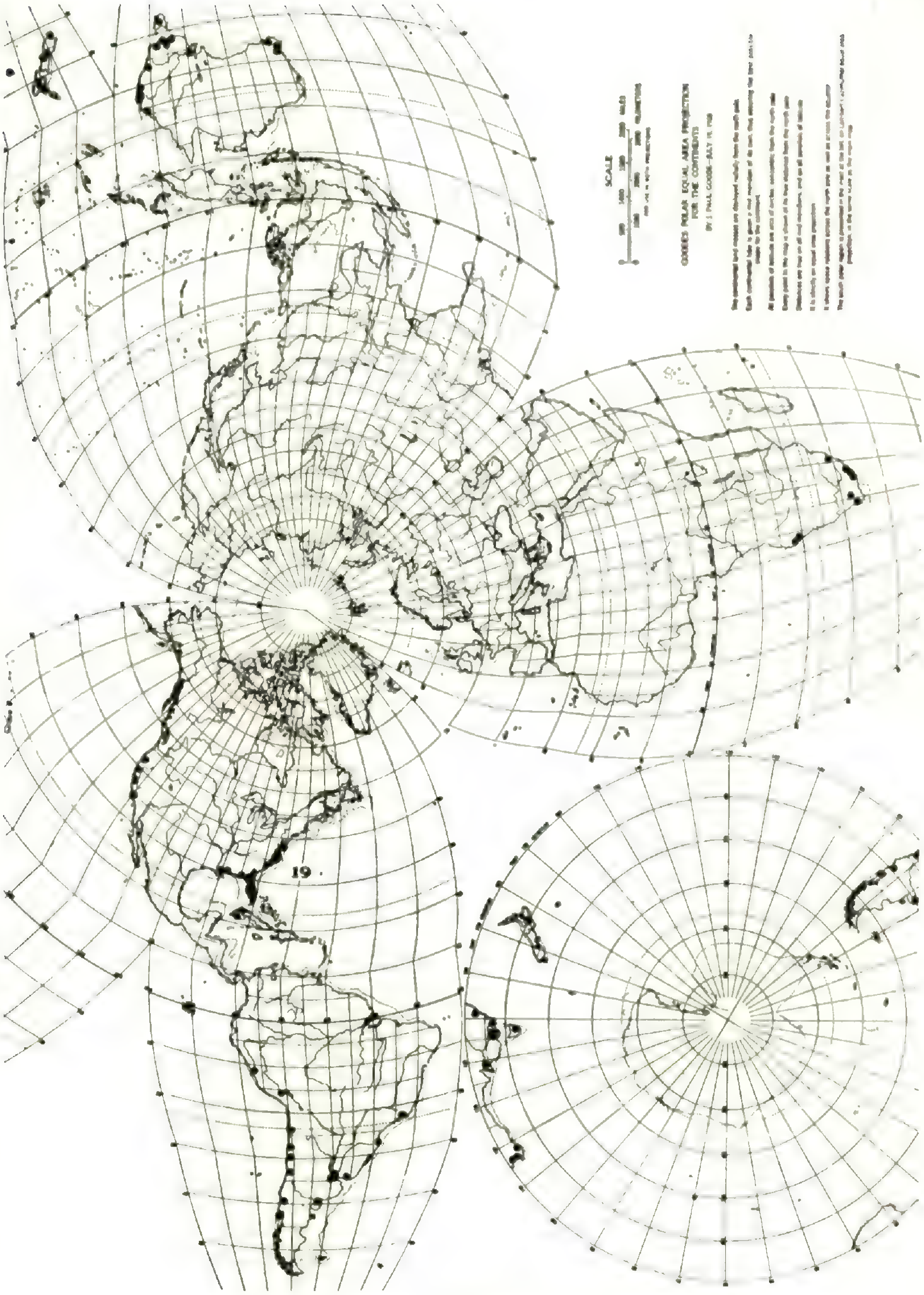
hours for low tide were between 7 and 10 in the evening and 5 and 8 in the morning! But to return to Powhatan Creek, northwest of Jamestown. The most obvious plant as we came to the tidal marsh was *Eryngium aquaticum* and we soon learned to expect it on every tidal marsh. *Cyperus haspan*, var. *americanus* Boeckel. (map 9), likewise, tropical and warm-temperate American representative of a pantropical species, was there and on most other such marshes, and so was the giant flaccid-leaved variety of *Rhynchospora macrostachya.* In Rhodora, xli. 533 (1939), I noted the occurrence of the species on the tidal mud of the James and the Chickahominy, whereas in the Great Dismal Swamp and in most regions it is a species of acid peat. The plant of many river-estuaries of Virginia is uniform in its thin and flaccid, greatly elongate leaves and its great stature (up to 1.75 m. high), and Miss Gale finds distinctive characters in the achenes. It will be further discussed in Part II. On the mud at extreme low tide were *Eriocaulon Parkeri* (map 17), whose Virginia citizenship has rested only on a collection of Grimes's on the Chickahominy, *Sagittaria subulata* (typical) and *Elatine americana* (map 18), the first from south of the estuary of the Delaware. When the incoming tide finally drove us back into the woods, there was *Scirpus fluviatilis* Harper, var. *virginiana* Fernald in Rhodora, xli. 532 (1939), which we had known only *south* of the James.

Forced out by high tide at Powhatan Creek, we drove westward and finally tried the shore at Wilcox Wharf on the James. The water was pretty high but we were there particularly impressed by a demonstration (discussed in Part II) of the transition from *Panicum agrostoides* to *P. condensum.* But the great prize was a repent plant of the *Commelinaceae*, quite strange to us. It was still very young, not beginning to flower. We were completely puzzled by it, for it did not belong either to *Commelina* or to *Tradescantia.* The spot was, consequently, carefully noted for a visit in September.

Long Island in Back Bay had supplied so many novelties that we wanted to return there. Miss Ryan and Miss Leigh had gone to the mountains; but we arranged with Mr. Bailey at the Pungo camp to get us out to the Island or the islands for the 24th and 25th. We did not then know that the conservation of

wild life involved so much plowing up and planting of the land to foreign crops as we soon discovered that it does—grain for the migrating geese, etc. When we reached headquarters at the appointed time the Manager had gone, expecting to return for us at once. But, as we learned that evening when we dined with Mr. Bailey, something had gone wrong with a tractor and it was impossible to come back for us. So, after deciding that we could not reach Long Island on the 24th, we drove to Munden in the afternoon and, taking roads and lanes out to the west side of Back Bay at every opportunity from there to Nowney Creek, when it was time to quit, accomplished some worthwhile exploration. Open muddy shores were often carpeted by two plants so alike in superficial aspect that we had to look twice to separate them: *Sesuvium maritimum* and *Heliotropium curassavicum.* Water-holes and pools were generally bordered by *Diplachne maritima.* Open flats were carpeted with *Eleocharis parvula;* and occasional colonies of *Triglochin striata* (MAP 19) exceeded in size of plant any we had ever met. This species, in its disrupted range (warm-temperate North and South America, South Africa, Australia and New Zealand), is fairly typical of many species which inhabit the fresh to merely brackish tidal shores in southern Virginia. They will be specially considered in Part III. Shallow pools at the inner border of the marsh were filled by a *Sagittaria* in full flower, often with oblong floating leaf-blades. This was *S. subulata* var. *natans* (Michx.) J. G. Smith, the first from so far north as Virginia, and with it was *Utricularia biflora,* also new to the state. At the inner border of one marsh *Asclepias lanceolata* (typical), also the first known in Virginia, was fruiting. When we were forced to stop collecting we felt that the afternoon had been well spent.

Next morning at the appointed time, 8 o'clock, Messrs. Bailey and Ewell drove us down the beach and the latter soon landed us at the old point on Long Island. From there we worked northward to the tip of the island, then back by a slightly different route to the landing. The water of shallow Back Bay was so very clear that we could see the white sandy bottom only a few feet below, except where *Potamogeton bupleuroides, Vallisneria americana* and the other aquatics made solid growth. Immediately upon landing we saw the sky-blue flowers of *Com-*



Map 19, Range of Triglochin striata.

melina diffusa Burm. f., the creeping species which we had got the year before on the bottomlands of Meherrin River. This began the season, for from late July to October the *Commelina*, usually along with its mysterious ally of Wilcox Wharf, was

found to characterize many tidal marshes and shores. Paths and borders of clearings on Long Island were often fringed by *Erigeron bonariensis* L., a tropical weedy species which Griscom, Long and I had once collected as a "casual" in Norfolk County; and one of the sandy fields supported *Diodia teres* var. *hirsutior* Fern. & Grisc., which had not been known north of North Carolina.

The marshy flat at the northern end of the Island was most interesting, for it is so characteristically what elsewhere would be called a subsaline marsh (See p. 000). *Polygonum prolificum,* usually of saline soils, and *Spergularia marina,* of seashores and saline or brackish soils, are there; *Sabatia amoena* (Raf.) G. Don (*S. stellaris* Pursh) of "salt marshes" was frequent; and the coastal *Lippia nodiflora,* the previous northern limit of which was on Knott's Island, abounded. Best of all, the *Pluchea* was a narrow-leaved and relatively small-headed plant, the tropical and sub-tropical *P. purpurascens* (Sw.) DC., heretofore unknown from north of southeastern Georgia and on the labels from there and from Florida frequently designated as growing on "salt marshes" or "brackish shores". In view of the assertion so definitely made to us by many who know Back Bay that it is "strictly fresh", it would be interesting to have analyses of the lowest films of water.

The material brought back to Petersburg from Back Bay was so extensive that we could get out on the 26th only for a short local trip. Having been told of a springy and mossy swale east of Burgess, where trumpets (*Sarracenia flava*) abound, we went to investigate. The swale, one of the best areas of the *Sarracenia* we know, was a gem, in spite of cattle and hogs. They had left the extensive colony of *Juncus caesariensis* Coville (*J. asper*), a species formerly supposed to be a New Jersey endemic, but subsequently found by Grimes near Williamsburg and by us in eastern Henrico County, in a spring-fed sphagnous bog greatly resembling this one, and recently discovered at an intermediate station (in Anne Arundel County, Maryland[9]). Now we had it in Dinwiddie County, and, just as in Henrico County it is associated with a group of singularly localized plants, so here its associates were among the rarities. For, at last, we were

[9] A. V. Smith, Rhodora, xli. 111 (1939).

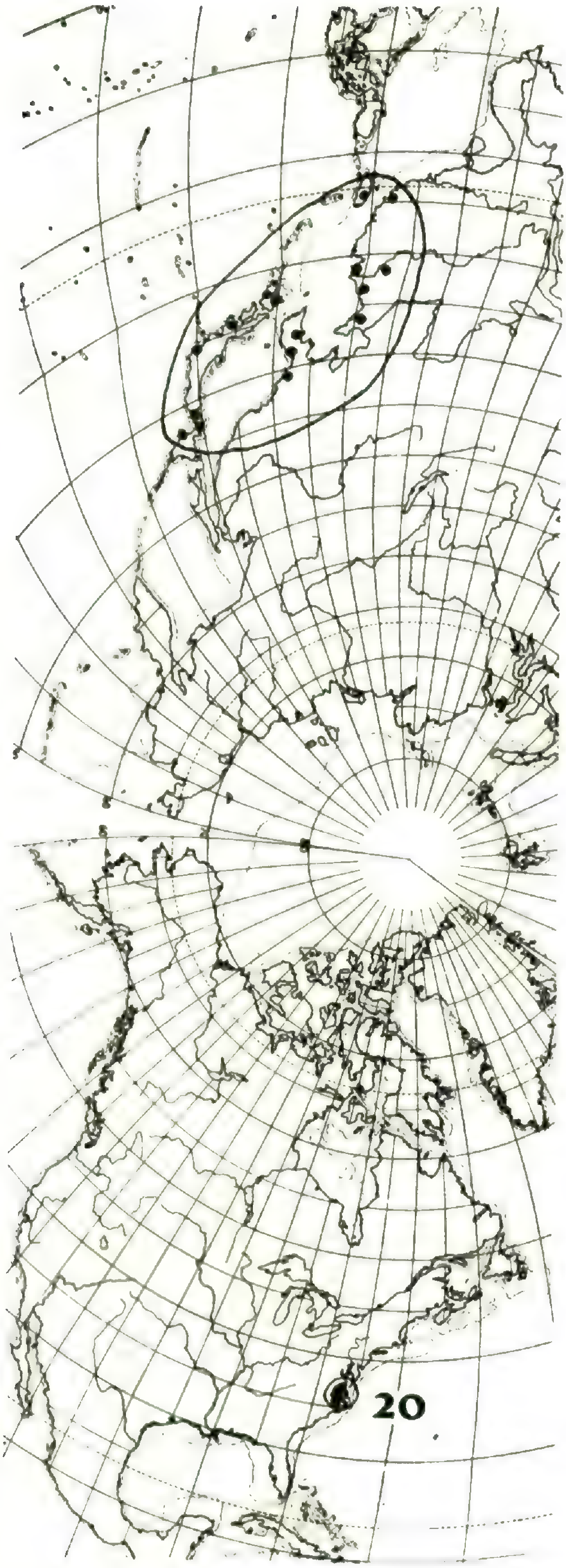
getting *Fuirena breviseta* Coville, which, known northward into North Carolina, we had vainly watched for in many Virginian swales. Here, too, was *Eriophorum virginicum*, a species very rare on the Coastal Plain of the state but frequent among the mountains; and mingled with them were tufts of *Scirpus debilis*, which we had never met in the state, though it is known in the Piedmont and upland area to the west. The *Pycnanthemum* of this bog puzzled us. Miss Elizabeth Boomhour of Duke University, who is closely studying the genus, tells me that it is *P. verticillatum*, heretofore known in the state only from the western counties. For a spot almost at our headquarters this one had too long been neglected. As we came up from the bog to the house of the owner, Mr. Blaha, a highly intelligent gentleman, we walked on rosettes of *Sanguisorba minor* which, we were told, colors areas of the farm when in flower. Young Mr. Blaha telling us of another swale which, however, had been plowed and, therefore, might not yield much, we went with him to look it over. But we were quickly diverted by the great abundance of dead-ripe and dropping fruit on *Vitis Labrusca*. Here in eastern Virginia it had been dropping for several days; in fact, on the 22nd of August we had found the fruit all on the ground in Charles City County. In New England we gather it a month later. In 1934 Long and I had first noted that the Fox Grape of the Coastal Plain of Virginia has less shouldered and smaller-toothed leaves than farther north and inland and that there is a somewhat evasive difference in the pubescence of the lower side of the blade, this frequently leaving a varnish-like print on the pressing-paper. Now, at last, we had good fruiting material. In Part II I shall illustrate true *V. Labrusca* (PLATE 636) and this Coastal Plain variety (PLATE 639) of it.

The brief half-day at the end of the August trip spent in weeding Petersburg, was, as usual, productive. *Humulus scandens* (Lour.) Merr. (*H. japonicus*) is there rapidly spreading, as it does farther north; *Leptochloa fascicularis* is coming in as a weed; and *Euphorbia heterophylla*, which we had never seen in Virginia, is appearing in waste spots. In the Norfolk and Western yard great clumps of true hirsute-sheathed *Eragrostis hirsuta* (Michx.) Nees have become established. In Rhodora, xli. 500 (1939), I pointed out that this typical extreme

of the species is essentially southern, the common var. *laevivaginata* Fernald of eastern Virginia having glabrous sheaths.

In September (14–24) we inevitably turned to the tidal marshes and tidal shores of the rivers. In view of the difference of 8 hours for low tide at the mouth of the James and at head of tide at Richmond and similar differences between Yorktown and head of tide on its two chief tributaries, the Pamunkey and the Mattaponi, I had asked my mathematically addicted son to prepare tables showing when we could expect low tide at different points, especially on the James and the Chickahominy. Armed with this invaluable document, Long and I were enabled to use our daylight to the best advantage for, if the tide was low at the mouth of the Pamunkey at 8:20 in the morning it would not be low at Windsor Shades, about 13 miles to the southwest, on the Chickahominy, until 12:40 noon. Thus, by careful planning we could collect at low-tide level on one river, then in a few minutes reach an adjacent river while the tide was just ebbing.

Our first adventure on tidal shores for the month was at the margin of the James at "Four Oaks", just below the ferry-landing near Harrison Point. Tide, as we expected, was going out, gradually exposing a broader and broader belt of estuarine plants. Here were the usual species of tidal shores, *Panicum agrostoides* var. *condensum* (Nash) Fernald, *Sagittaria falcata* Pursh, *Aeschynomene virginica, Lilaeopsis chinensis* (L.) Ktze., etc.; and, nestled among them, unmistakable *Eriocaulon Parkeri,* which we had found along Powhatan Creek, and *Isoëtes saccharata,* which, when we got it on the lower Nottoway, was the first from south of the Potomac. *Commelina diffusa* was finely flowering and, since it is necessary to catch the expanding corollas early in the day if one wants good material, we proceeded to lay the sky-blue flowers between folds of waxed paper (to prevent adhesion to the pressing paper), when we suddenly espied its relative of Wilcox Wharf now in full bloom. We were greatly excited, for the plant, which we soon found to be a characteristic element in the fresh tidal marshes of the James, Chickahominy, Pamunkey and Mattaponi and their tributary creeks and for want of a name called "Pinky Posy," proves to be *Aneilema Keisak* Hassk. (MAP 20), an addition to the more



Map 20, bicentric Range of Aneilema Keisak.

than 350 identical species sharing eastern Asia and eastern North America. In view of the recognition of this striking relationship for nearly a century and of our supposed familiarity with the flora of the Atlantic states, it was certainly very thrilling to be adding another to this ancient series of species, now with a strikingly bicentric range. While we were enthusiastically collecting *Aneilema* and laying its freshly expanded flowers between waxed papers, the owner of "Four Oaks", Mrs. Fox, came to the shore and, after learning the cause of our excitement, most hospitably invited us to her porch for refreshment and for shelter from the extreme heat. Mrs. Fox's hospitality is what we unfailingly meet from the owners of estates along the James, as soon as they learn what the pair of wet and muddy naturalists are really doing. But to return to the tidal

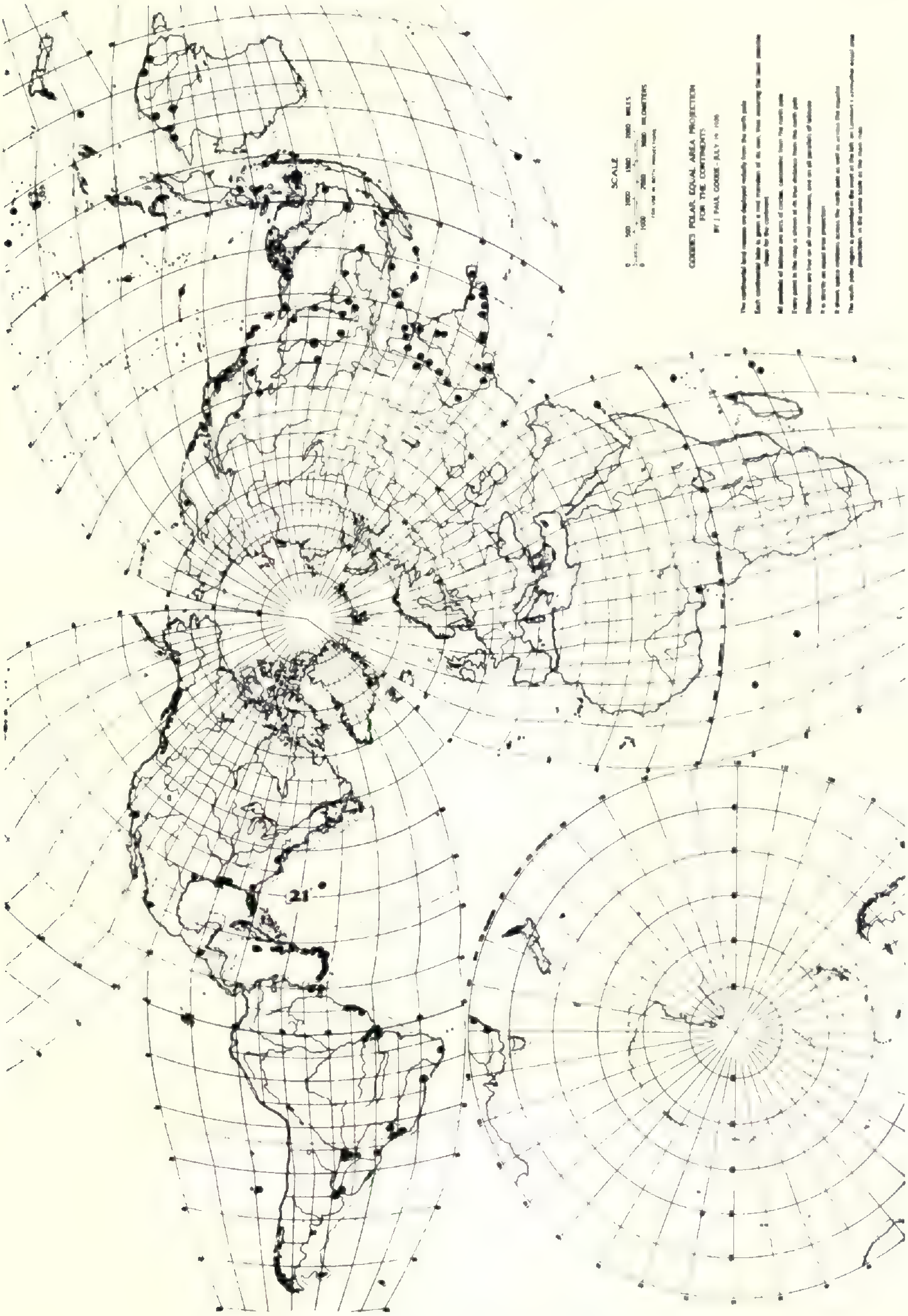
margin of the James. Seeing a gigantic *Cassia fasciculata* Michx. (*C. Chamaecrista* of our manuals not of L.), nearly 5 feet high, I pulled the plant because of its exceptional size, planning to trim it down and fold it back and forth in press, as a record specimen. But merely casual examination caused us to keep the segments, for the pubescence seemed to us unfamiliar and the legumes and seeds enormous—legumes up to 8.5 cm. long and 1 cm. broad, the immature seeds 7 mm. across. We were frankly puzzled by it, for its habitat (inundated tidal mud) was all wrong for *C. fasciculata* and its details were just as atypical. I had unwittingly pulled up the only individual and there were no ripe seeds to scatter!

We had spent several hours on the shore at "Four Oaks" and when we left the tide was turning. Incidentally, when we had left home in the morning we had started out to visit one of the marshes near the head of tide on the Chickahominy; and now it would soon be too late. Quite at random we drove down to "Shady Rest", the place of Mr. W. T. Walls at Windsor Shades. Mr. Walls, keenly interested in the flora of his marsh, told us that from April to October there is something bright flowering there. The season evidently starts with golden club (*Orontium*) and in September the inevitable *Aeschynomene virginica* with creamy-yellow and purplish papilionaceous flowers towered above golden masses of *Bidens laevis* and forms of *B. coronata*. *Aneilema Keisak* leaned on the other vegetation and ascended to a length of 6 feet, its roseate flowers borne in elongate but interrupted leafy racemes. *Eleocharis quadrangulata*, which in Virginia is usually, if not always, confined to tidal marshes and shores, abounded, along with unusually tall *Sacciolepis striata* (with panicles up to 3 dm. long), and towering high were the great inflorescences (up to 1 m. long) of the estuarine variety of *Rhynchospora macrostachya*. The tide was rapidly making but outside the dense swale we were able to get the inevitable *Isoëtes saccharata* and, best of all, a few quite characteristic fragments of *Potamogeton Spirillus* Tuckerm. In the northern part of its range ubiquitous in fresh ponds and streams, it there shows no aversion to tidal waters. Southward, however, its southeastern known extension has been in tidal waters of the

Delaware system. New to Virginia, still farther south, it is here in the tidal margin of the Chickahominy.

Aiming another day for the great tidal marshes of the Chickahominy, we crossed the James from Jordan Point to Harrison Point and were starting down-stream when, crossing the somewhat uninspiring Kimmages Creek, we saw that it too was tidal. *Aneilema* and its regular companions were here, but nothing novel. Then, driving out toward Weyanoke, we came to the upper stretch of marsh along Kittewan Creek. The brilliant display of *Bidens* with high-towering *Aeschynomene* lured us in. Here was the big *Cassia*, nearly 6 feet high, in greatest profusion, holding its characters and obviously completely drowned at high tide—a most unusual habitat for any *Cassia*, but on the fresh tidal reaches of at least the James and the York and their many tributaries the conventional one for this conspicuous plant. In Part II I shall describe and illustrate it (PLATE 635). *Aneilema Keisak*, of course, was here, the creeping, leaning or ascending stems freely forking, and in marginal thickets beginning to mature the seeds which have enabled Dr. Hiroshi Hara and me to conclude that it is inseparable from the Japanese plant, except that in eastern Asia the petals may often have a more violet or bluish coloring. Emulating in stature its still thrilling associates, *Spiranthes cernua* var. *odorata*, which we had earlier found on the inundated bottomland of Fontaine Creek, was here abundant and in full bloom, the splendid racemes less fragrant than in the relatively small typical *S. cernua*.

Crossing the mouth of the Chickahominy, we went to its tributary, Gordon Creek. The broad tidal marshes there were splendid but the deep submerged paste-like clay was so vigorous in its suction that we soon quit. All the specialties of the fresh marshes were there and we also got the pale-scaled estuarine form of *Cyperus rivularis:* forma *elutus* (C. B. Clarke) Kükenthal, a pale form characteristic of such shores northward to southern Maine and strikingly unlike typical dark-scaled and relatively low *C. rivularis.* Along Gordon Creek the pale form was 6 dm. high and with an inclination to thickened bases. Quitting Gordon Creek, which would yield good returns if one could explore it by boat, we stopped just above the entrance of



Map 21, Range of Cyperus brevifolius.

the Chickahominy into the James, below Barrat's Bridge (formerly Barrat's Ferry, the bridge opened during the summer of

1939). The still pretty nice series of species abounds there; but under water, completely submersed when we found it, was the tidal-shore form of *Xyris caroliniana* with floating ribbon-like leaves, which Long had been sending me from the lower Delaware. Here, again, was another identity, though this only of minor taxonomic importance, between the flora of the lower Delaware and of these southeastern Virginian tidal shores. The great prize of these marshes, however, was the stoloniferous and extensively creeping pantropical *Cyperus brevifolius* (Rottb.) Haussk. (*Kyllinga brevifolia* Rottb.), widely dispersed in tropical and subtropical regions (MAP 21) but heretofore unknown in eastern North America between its stations in Florida and adjacent Georgia and the isolated colony on the lower Delaware. This was pretty fine but, after helping dig a good series of plants and leaving Long on dry land to lay them into paper, I pushed farther out into deep water and found myself in a colony of a purple-rayed *Boltonia*. This was the third species of the genus we had found in eastern Virginia and quite like one which Griscom and I had collected on our late-September trip in 1933 on the tidal marshes of North Landing River. By current treatments all three go into the too inclusive *B. asteroides*, but the plant of tidal marshes is freely stoloniferous, the other two species of southeastern Virginia not at all or but slightly so, and one of them has tiny white heads. The discovery of the plant of North Landing River had led Griscom and me to attempt a revision of the group. Our tentative results were held back pending receipt of photographs of types from abroad; but this discovery of a new colony was the signal to revamp and strengthen the unpublished treatment of seven years ago. This, with illustrations, will be found in Part II.

Forced out by high tide, we drove west, hoping to beat the incoming tide up-river. We took a chance on the shore near Tettington, but there we found sand-beach, with vigorous weedy colonies of soy bean and peanuts and other signs of man's invasion. The native flora, however, was interesting, for here, far up the James and mingled with typical plants of fresh sands, there were colonies of *Spartina patens* var. *juncea*, *Panicum amarum* and other maritime species. Best of all, the upper border of the beach was covered with characteristic *Apocynum*

sibiricum Jacq., the northern white-flowered species which Woodson, in monographing the genus, recorded southward in the Atlantic coastal region only to Delaware and the District of Columbia.

Still having a remnant of daylight when we reached Charles City Courthouse, we drove northward for a ten-minute glimpse of the Chickahominy at Long Bridge. The ten minutes were well rewarded. On the wooded bottomland in New Kent County we might have been in Southampton County, 50 miles to the south. Here were *Leersia lenticularis*, which we had never seen north of Sussex County, *Hypoxis leptocarpa* Engelm. & Gray, a southern species which was new to Virginia when we found it in Southampton, and *Lysimachia radicans*, with which we had been keeping regular appointments at Cypress Bridge in southern Southampton. The bottomlands of the Chickahominy evidently need close study; but we had been out since an early breakfast, had explored six remote localities and, with darkness coming on, were willing to leave the Chickahominy bottoms and "call it a day".

Our September work had led us to the region north of the James, but we had not wholly forgotten the allurements of the pine-barren regions of western Nansemond and southeastern Southampton. The sandy pine barrens and pinelands several miles south of Franklin, where "Long's Flannel-weed", *Chrysopsis Longii* Fernald in Rhodora, xl. 467, pl. 531 (1938) and *Tradescantia rosea* Vent. var. *graminea* (Small) Anders. & Woodson abound, are always fascinating. On most of our visits heavy rains had made the wood-roads too full of water-holes for comfortable driving. On September 20th, however, the roads being well dried out, we made a circuit out to Point Beach on the Nottoway (where *Styrax americana* is very fine), thence northwestward to Round Gut on the same river and eastward via Wiggins School to the automobile road. Fine material of many rare species was collected and we were delighted to find *Zenobia pulverulenta* in Southampton County, much taller than in Nansemond (even if Pursh, nearly 140 years ago, "beat us to it" by collecting in Southampton the very rare *Litsea geniculata*, which has not subsequently been found, he did not discover *Zenobia!*). The local *Trichostema setaceum* Houtt. (*T. lineare*)

abounded and was very large, and in a patch of hickory and oak woods (usually relatively rich) *Kuhnia eupatorioides* was at its easternmost station. In the sandy woods at Round Gut the *Tephrosia spicata* looked unusual. This was because the plants are nearly glabrous, instead of densely pilose-villous. I have been tempted to glorify the type-locality of this plant by applying to the latter the name splanchnodita, but the glabrous or glabrescent plant occurs at other stations; I am, consequently, giving it a less suggestive name in Part II.

Chinquapin, *Castanea pumila,* was heavily fruiting in the barrens and very puzzling. Some shrubs had the burs densely covered with erect long-rayed scales, others had the rays or bristles short and erect, while in others the remote scales had depressed and horizontally divergent rays, their tips often not touching and thus leaving broad naked areas. Such differences in the cups of acorns would be strongly specific, but in *Castanea pumila* the different variations all have essentially uniform foliage and nuts. We ate the nuts inordinately and filled all receptacles we could find with more nuts to take home. Tragically, however, when we opened the containers at home, we found them squirming with the fattest of grubs. We could merely take comfort by remembering the ancient conundrum about the half-worm in the partly eaten apple! I have carefully compared our material with the extensive series at the Arnold Arboretum. The shrub or small tree with broad naked spaces on the involucre is *C. pumila*, var. *Ashei* Sudworth, heretofore known from southeastern Texas, Arkansas, and Louisiana to Georgia and northeastern North Carolina. The one with very long erect bristles is a close match for *C. pumila,* var. *Margaretta* Ashe, which Ashe (for years familiar with the Carolinas) knew chiefly from "the upper edge of the longleaf pine lands of Texas and Louisiana". Ashe did not know it from the Atlantic States (only from western Alabama, Mississippi, Louisiana, Arkansas, Oklahoma and Texas). This isolation in southeastern Virginia is like that of scores of other plants; the next step is to find var. *Margaretta* and the other plants in the Carolinas and Georgia.

Returning on the 22nd to the pine barrens of western Nansemond County, I asked Leonard to stop the car at the wood-road leading to Milk Landing, where in July he and Long had

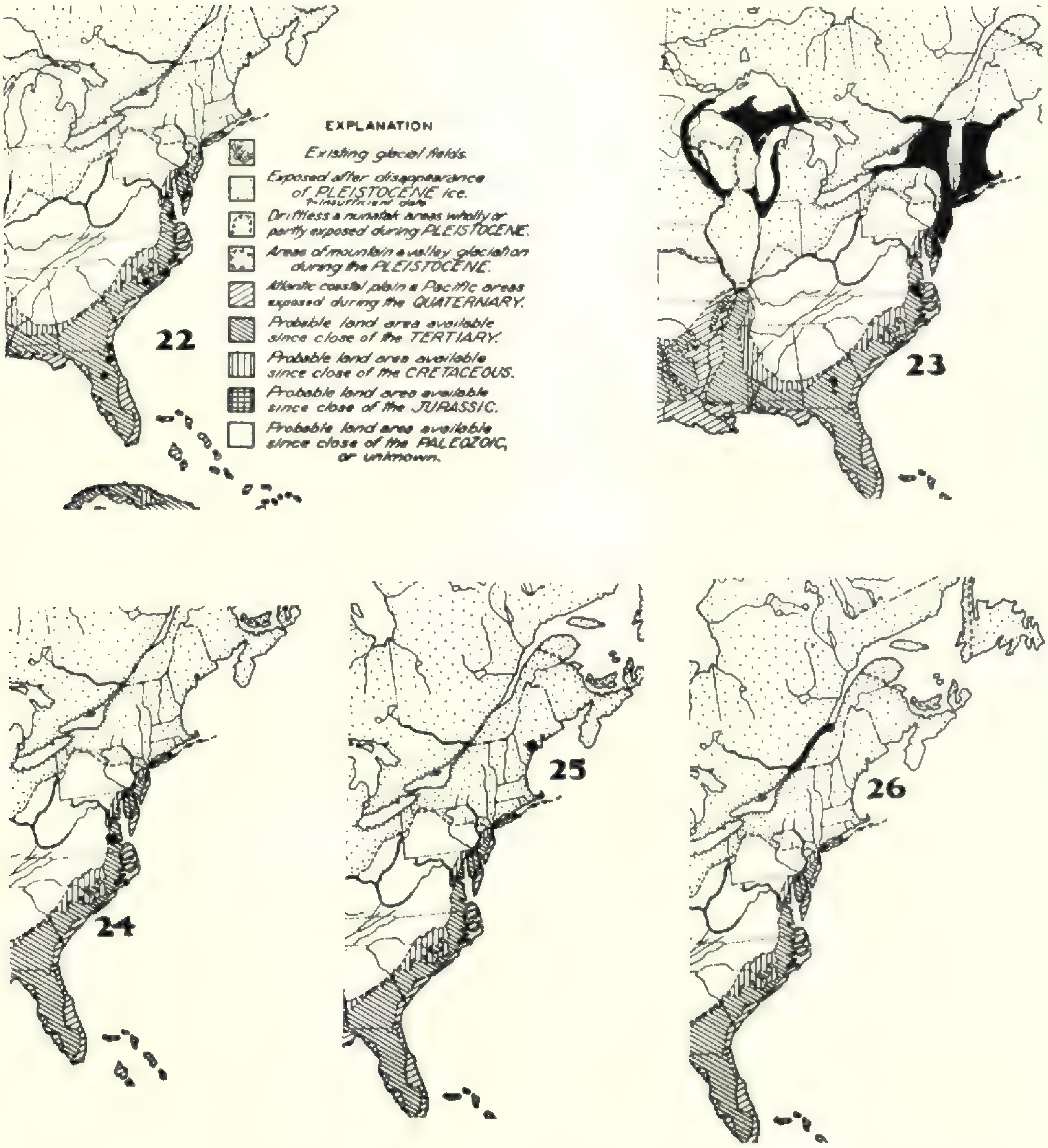
been unmercifully peppered with seed ticks. I knew that I must start alone, for the memories of the place were still too sad for me to hope for Long's company. But he soon caught up with me, fearing that I might discover something interesting and correctly reasoning that the seed ticks of two months before were no longer waiting for him. And when we got to Milk Landing the Blackwater was at low tide. The little ribbon of tidal vegetation under the overhanging shrubs was tiny and interrupted but in five minutes we had *Sagittaria subulata*, the submersed form of *Xyris caroliniana* and, near the head of tide which runs up from Albemarle Sound in North Carolina, *Aneilema Keisak*. It surely must grow in North Carolina as well as in Virginia! Slightly farther down-river, at Cox Landing, we got *Eriocaulon Parkeri* only 3½ miles north of North Carolina.

The sphagnous savannah-like bog at Tom Hunter's was gorgeous with the orange and brown heads of *Coreopsis oniscicarpa* Fernald in Rhodora, xl. 472, pl. 533 and 534 (1938). The plants were up to 9 dm. high, often with 30 to 60 heads. This is the greatest station we know, but the species continues abundant eastward to the region of Cleopus. South of this area, not far from Cathole Landing, the white sands support, among superabundant *Carphephorus bellidifolius*, fine colonies of *Phlox Hentzii* Nutt. (discussed in Part II) at its easternmost known station, *Eupatorium tortifolium* Chapm., which we had already got near Sandy Landing, a northern extension; and, the great prize of the day, extensive carpets of a prostrate *Desmodium*, now over-ripe but quite strange to us. It proves to be true *D. glabellum* (Michx.) DC., quite unlike the rare plant which passes in our manuals under that name, the latter being *D. humifusum* Beck. Michaux's South Carolina type is represented in the Gray Herbarium by a fragment (leaf) and by a very clear photograph. Otherwise, so far as I can find, the species is unknown. In late August, 1940, we secured a representative series of specimens. These will be discussed in a later report. The discovery of *Desmodium glabellum* at dusk closed our exploration of the native flora for the month, except that on the 23d we went to Carey Bridge to get flowering material of *Chelone obliqua* (found too young earlier in the season).

The regular 2-hour weeding of Petersburg, after the presses were finally emptied and we awaited the afternoon train, brought us, among other unusual adventives, a labiate which greatly puzzled us. It proves to be *Hyptis mutabilis* (A. Richard) Briq. var. *spicata* (Poir.) Briq., the West Indian and Floridan representative of a tropical American species. At Petersburg, growing on a weedy bank, it is far from home. The weed which makes the fortunes of many residents of Petersburg and of Richmond is *Nicotiana Tabacum*. We were more interested in *Hyptis mutabilis!*

In October (12–17) our limited time was mostly devoted to the fresh tidal shores, although we started off by returning to the Great Dismal Swamp, near the Camp Lumber Company's plant southeast of Whitemarsh School. We were primarily after mature fruit of *Ilex coriacea*, already noted; but we found the wonderfully developed phyllodia of *Sagittaria Weatherbiana* Fernald which will be specially noted in Part II, extended eastward the ranges of *Leersia lenticularis* and *Scirpus divaricatus*, and, in the clearings, found unusually strong and heavily fruiting plants of *Viola esculenta* Ell.

On the 13th we returned to "Shady Rest" for mature fruit of *Aneilema Keisak*. On this trip we noticed that the deep channel which runs through the marsh was full of *Potamogeton epihydrus*, var. *Nuttallii* (C. & S.) Fern., here found for the first time south of the Potomac, a fitting companion for the northern *P. Spirillus* which we got here in September. High tide forcing us from the Chickahominy, we then went north to the York, where we could still have four hours of low water. We spent some time on the sandy beach north of Holly Forks, this region of the upper York being essentially sea-shore, with carpets of *Euphorbia polygonifolia* and other maritime plants. On a steep sandy slope there was an abundance of *Sporobolus asper*, which we had never met in Virginia. Upon referring to Hitchcock's Manual it becomes evident that the species is new to the state. It was obvious that for fresh tidal marshes we must go up the Pamunkey and the Mattaponi which unite to form the broad salty York. So we drove up the former river and tried the marshes east of White House. *Aneilema*, the new *Cassia* and *Aeschynomene* were there and we at once set ourselves the task



Map 22, Range of Bacopa cyclophylla (derived largely from *Pennell*); 23, of Polygonella articulata; 24, of Bacopa obovata; 25, of Cardamine Longii; 26, of Gentiana Victorinii.

of following these three index-species to the northern limits of their range (a task not yet finished).

Next day, after some exploration in other areas, we reached the Mattaponi at Horse Landing, near King William Courthouse. The shores were so fine and the tide so unaccommodating that we returned for a second day, at low tide. All the standard species, including the variety of *Rhynchospora macrostachya*, were there, as were the less common *Eriocaulon Parkeri* and *Elatine americana*. *Spiranthes cernua* var. *odorata* was there producing young

plants (rosettes) at the tips of the prolonged roots;[10] and in the outer mud, exposed at extreme low tide, *Hypericum mutilum* var. *latisepalum* Fernald, heretofore known only from Florida to Texas, was mixed with scattered individuals of the excessively rare and little collected *Bacopa cyclophylla* Fernald (*Herpestis rotundifolia* Gaertn. f., not *B. rotundifolia* (Michx.) Wettst.), this being the eighth known station and the first between Wilmington, North Carolina and the two colonies on the Eastern Shore of Maryland (MAP 22). In southeastern Virginia *Bidens coronata* (L.) Britton is chiefly represented by var. *trichosperma* (Michx.) Fernald in Rhodora, xl. 350, t. 506, figs. 8 and 9 (1938); but along the Mattaponi some plants had coarse and often simple leaves and very large broad-based awns. They can be referred only to typical *B. coronata*, which in the Atlantic States had been unknown south of the lower Delaware.

Farther up river, opposite Walkerton, the marsh was bordered by a towering thicket of *Aeschynomene*, so dense and so high above our heads that we finally abandoned the last lingering pretense that it is rare! And slightly below Walkerton, on the King and Queen side of the river, the index-plants were all seen, and with them *Bidens coronata*. Having trailed the quarry to King and Queen, the obvious step was to hunt for the group on the next river to the north, the Rappahannock. We made a tactical error, however, in going toward Tappahannock, for there the marshes are salt and it was obvious that we must go much farther up river for fresh tidal shores. Consequently, the hour being late, we went to the nearest open shore, at Richmond Beach, on the Rappahannock in Essex County. The maritime character of the area was evident from the abundance on the sands of *Diodia teres* var. *hystricina* Fern. & Griscom of the sands of Cape Henry and of Yorktown. In the thicket back of the beach the giant *Arundo Donax*, up to 15 feet high, was thoroughly naturalized. We selected small panicles and by folding them back and forth and tying their tips to the bases of the inflorescences secured specimens which can be kept within the limits of the herbarium-sheet.

One trip was made to the pine barrens south of South Quay.

[10] Correll says: "often in dense clumps because of its stoloniferous habit"—D. S. Correll, Bot. Mus. Lfts. Harvard Univ. viii. 81 (1940).

At Tom Hunter's we were happy to find the new *Lilium* with mature fruit and abundant seeds; and in one seeping or springy spot *Utricularia fibrosa,* rare in Virginia, was flowering. *Quercus cinerea* Michx., abundant in all the pine barrens of southeastern Virginia, is sometimes well-behaved, but it often mixes with the other oaks. One of the most striking hybrids, of which we found a characteristic tree, is × *Q. subintegra* Trelease (*Q. cinerea* × *falcata*). In 1940, at the northern limit of *Q. cinerea,* in Sussex County, we felt that its hybrids with various species were almost as abundant as typical *Q. cinerea.* One of our chief errands at this time was to collect, at last, flowering material of the *Polygonella,* of which we had found seedlings in July. The plant was very abundant, and we traced it across the state-line, nearly to Wyanoke in Gates County, North Carolina. The larger plants, heavily loaded with flowers and fruit, were 8 dm. high, but, alas, they are only the northern *P. articulata* (MAP 23). Alas!—nevertheless the species is really a most interesting one to find in southeastern Virginia and northeastern North Carolina. There is an old specimen of Thomas Nuttall's at the Philadelphia Academy, marked simply as from "Georgia". Otherwise, there are no specimens of this essentially northern species in the herbaria of the Philadelphia Academy and the New York Botanical Garden nor in the Gray Herbarium from south of the Eastern Shore of Maryland. Our disappointment in not having a typically more southern species was, consequently, tempered.

Thus our season of botanical exploration came to a close. It had been one of unusual discoveries in view of all the previous work in the same area and, even if the record shows less than one hundred maintained species and geographic varieties, which by some would be treated as species (for instance *Andropogon virginicus,* var. *glaucus,* maintained by Nash, Small and Hitchcock as a species, *A. capillipes* Nash), the inclusion of several well marked forms which deserve designation (some of them usually called species, as in case of *Commelina crispa* Wooton or the green-leaved form of *Zenobia,* maintained by Small as a species, *Z. cassinefolia*) fully justifies the title I have given to this report of progress. The records in abbreviated form constitute Part II; for the convenience of users some of the data

diffusely stated in the Narrative is repeated. In Part III brief consideration will be given the phytogeographic problems raised by some of the discoveries, especially those of the fresh tidal shores.

Part II. Enumeration and Consideration of the More Noteworthy Plants

As in previous reports species, varieties and forms of significance in reaching an understanding of the flora of the Coastal Plain of southeastern Virginia are enumerated. Some records are from collections of earlier years; a few are of plants in the Gray Herbarium, collected by others; and in a few cases specimens collected in 1940 are included in order to complete the record to the date of going to print. In most cases, where the plants were collected by Long and me, it has seemed unnecessary to repeat the names of the collectors. In course of identifying the material many genera or groups of species have been critically studied. In so far as these revisional studies have grown out of the Virginia work they are here included. The photographs and material for the plates have been prepared by my assistant, Walter H. Hodge, or by my son, Henry G. Fernald. The maps showing world-ranges are on base-maps of the Goode series, copyrighted by the University of Chicago. The initial cost of photography and preparation of blocks has been partly met through appropriations for personal research from the Department of Biology of Harvard University; the cost of their reproduction through the generous support of Mr. Long. The names of plants thought to be reported for the first time from Virginia are preceded by an asterisk (*).

Cheilanthes lanosa (Michx.) Watt. Sussex County: ledges in rich woods at the "fall-line" along Nottoway River, above Double Bridge, about 6 miles northwest of Jarratt, no. 10,862.

Close to the inner border of the Coastal Plain. See p. 383.

Equisetum arvense L. Southampton County: in lime-marl, wooded bottomland of Three Creek, northwest of Carey Bridge, no. 10,071.

Equisetum arvense, so common in all damp habitats in the North, is rare in southeastern Virginia, and always, so far as we have observed, in calcareous pockets. See p. 363.

Lycopodium inundatum L., var. adpressum Chapm., forma **polyclavatum** (McDonald), comb. nov. *L. adpressum*, f. *polyclavatum* McDonald in Fern Bull. ix. 9 (1901). *L. alopecuroides*, var. *adpressum*, f. *polyclavatum* (McDonald) Clute in Fern Bull. xvii. 45 (1909). Sussex County: argillaceous swale southwest of Grizzard, no. 10,866.

In originally describing the variety, Chapman used the spelling *Lycopodium inundatum*, var. *appressum* Chapm. in Bot. Gaz. iii. 20 (1878). Subsequently, however, he took up the alternative spelling, var. *adpressum* Chapman, Fl. So. U. S. ed. 2: 671 (1883), holding to this altered spelling in the 3rd edition (1897). Most authors have used the second (and by Chapman obviously preferred) spelling. If it be maintained by some that an author has a right to correct his own error (assuming that Chapman so considered his first spelling), then, immediately, an equally strong group will argue that the original spelling must stand. As one who has been forced through typographic, orthographic or stenographic errors into misspellings, I have claimed the right to correct them. This is quite different from alterations made by others. In the latter cases, unless an evident error is corrected they are not justified. In the case of Chapman's name, of course, the original spelling was etymologically as correct as the substitute.

*L. carolinianum L. Greensville County: argillaceous and sphagnous meadow northwest of Taylor's Millpond, nos. 10,075, 10,867.

Certainly a very rare plant in Virginia. We have met it only at this station, a much burned peaty meadow or swale, where the *Lycopodia* of bogs have a remarkable and perplexing development. I have been unable to trace the source of the record for Virginia, sometimes given. Lloyd & Underwood in Bull. Torr. Bot. Cl. xxvii. 158, 159 (1900), cited no material from between southeastern North Carolina and southern New Jersey, although there is a single station in Maryland. In August, 1934 (Claytonia, i. 3) Massey, in his account of the genus in the state, said: "No reports of its having been collected in Virginia are at hand." See p. 358.

Isoëtes saccharata Engelm. Fresh tidal shores. King William County: Mattaponi River, at Horse Landing, near King William Courthouse, no. 11,508. New Kent County:

Chickahomimy River at "Shady Rest", southeast of Windsor Shades (Boulevard Postoffice), no. 11,507. Charles City County: James River at "Four Oaks", below Harrison Point, no. 11,216. Nansemond County: Blackwater River, Milk Landing, south of South Quay, no. 11,217. Southampton County: Nottoway River, Knight's Seine Beach (Battle Beach), no. 10,082.

Pfeiffer, in her *Monograph*, cites no material from south of tributaries of the Potomac near Alexandria. Knight's Seine Beach is barely *not* in North Carolina; *I. saccharata* will doubtless be found in that state farther down the Nottoway or on the Chowan. See pp. 364, 391 and 393.

*I. Engelmanni A. Br., var. caroliniana A. A. Eaton. Greensville, Southampton, Nansemond, Sussex and Dinwiddie Counties, frequent and often abundant on the wooded bottomlands of the larger rivers and creeks (Meherrin and Nottoway Rivers, Fontaine Creek, Three Creek, Somerton Creek, Rowanta Creek) and even along small runs in the woods, fruiting from mid-May to August, usually in June, most colonies being over-ripe and nearly unrecognizable by mid-summer (many nos.).

Extension north from Georgia and mountains of North Carolina. See pp. 358, 367 and 375 and map 2.

Taxodium distichum (L.) L. C. Richard, var. imbricarium (Nutt.) Sudw. (*T. ascendens* Brogn.). Common on wooded bottomlands and even on tidal shores of rivers, many collections from James City, Sussex, Southampton and Greensville Counties.

Influenced by the persuasions of those who see two species of *Taxodium* in the South, we called our collections made in June *T. ascendens*. Finally, however, noting that the characters separating the two were very fickle, we reached the conclusion of Sudworth and of the late Carl Mohr. The latter's statement is one with which we have full sympathy:

> Of smaller size than the species, with the leaves reduced in size and closely appressed to the deciduous branchlets, thus imparting to the tree a strikingly peculiar aspect. This character, however, is not constant, and the variety can scarcely be maintained, the same individual producing during the earliest stages of growth and on vigorous adventitous shoots leaves of the ordinary form.
>
> This form passes freely into the species where the soil conditions are more favorable.—Mohr, Pl. Life of Alab., Contrib. U. S. Nat. Herb. vi. 325 (1901).

After a strong wind in early summer, many of the deciduous

branchlets bearing only the small leaves of the variety will be found on the floors of bottomlands. In Virginia, at least, this form is not confined to pond-margins, as it is sometimes said to be farther south. Probably var. *imbricarium* is not a true variety, but merely a state of development or a seasonal stage.

Typha truxillensis HBK. Princess Anne County: brackish to fresh marsh along Back Bay, at eastern margin of Long Island, no. 10,476. Sussex County: argillaceous ditch by Norfolk and Western Railroad, about 2 miles west of Waverly, no. 10,477. See pp. 374, 376 and map 8.

Recorded in 1935 (Rhodora, xxxvii. 385) from shores of Back Bay, the first area known north of Florida. The station in Sussex County is 65 miles inland and extends the range northward to lat. 37° 2′, from the former northern limit at 36° 40′.

*Potamogeton Spirillus Tuckerm. New Kent County: Floating at outer border of fresh tidal marsh by Chickahominy River, at "Shady Rest", southeast of Windsor Shades (Boulevard Postoffice), no. 11,219.

Extension south from the lower Delaware River and adjacent waters of southwestern New Jersey and of Delaware. See p. 374.

P. epihydrus Raf., var. Nuttallii (C. & S.) Fernald. New Kent County: in open water, fresh tidal marsh by Chickahominy River, at "Shady Rest", southeast of Windsor Shades (Boulevard Postoffice), no. 11,541.

Extension south from the Potomac. See p. 400.

Triglochin striata R. & P. To the station on North Landing River, recorded in 1936, add the following, also in Princess Anne County: inner border of brackish to fresh marsh along Back Bay, at eastern margin of Long Island, no. 10,479; turfy knolls in shallow pools in brackish to fresh marsh along Back Bay, east of Creeds, no. 10,876, very fine development, plants nearly 3 dm. high, with spikes more than 1 dm. long. See pp. 387, 388 and map 19.

Sagittaria subulata (L.) Buchenau. To the few recorded stations add one in James City County: tidal mud along Powhatan Creek, north of Jamestown Island, no. 10,877. King William County: fresh tidal shore of Mattaponi River at Horse Landing, near King William Courthouse, no. 11,512. Nansemond County: muddy tidal margin of Blackwater River, Milk Landing, south of South Quay, no. 11,220. See pp. 386 and 399.

*S. subulata, var. natans (Michx.) J. G. Sm. Princess Anne County: shallow pools in fresh to brackish marshes along Back Bay, east of Munden, no. 10,878; east of Creeds, no. 10,879;

along Nowney Creek, southeast of Back Bay Postoffice, no. 10,880. See p. 387.

I am keeping as var. *natans* the narrower-leaved plant which was included by Chapman, along with the coarser Florida plant, under his *Sagittaria natans*, var. *lorata*. As I interpret *S. subulata* it consists of four fairly marked varieties as follows.

S. SUBULATA (L.) Buchenau, var. **typica.** *Alisma subulatum* L. Sp. Pl. 343 (1753). *S. pusilla* Nutt. Gen. ii. 213 (1818). *Echinodorus subulatus* (L.) Engelm. in Gray, Man. 460 (1848). *S. subulata* (L.) Buchenau in Abh. Nat. Ver. Bremen, ii. 490 (1871).—Dwarf; leaves linear, strap-shaped, obtuse to acutish, 2–12 cm. long, 1–3 mm. broad, exceeding to shorter than scape, rarely with a narrow blade up to 2 cm. long and 4 mm. broad; inflorescence 1–4 cm. long; pedicels in 1–3 whorls, the 1 or 2 fruiting ones stouter and shorter than the others, recurved, 0.5–2 cm. long; bracts scarious, connate or spathe-like and oblique, obtuse or with prolonged tips, 3–5 mm. long; filaments 6–8, glabrous; fruiting heads nodding, 4–6 mm. in diameter; achenes obovate, 1.6–2.3 mm. long, 0.7–1.4 mm. broad, wing-margined, with slenderly keeled faces, the lateral to subterminal subulate beak 0.3–0.4 mm. long.—Fresh to brackish tidal mud, Florida and Alabama, north to Massachusetts.

Var. NATANS (Michx.) J. G. Smith, N. Am. Sp. Sagittaria and Lophotocarpus, 18 (1894), at least as to type. S. NATANS Michx. Fl. Bor.-Am. ii. 190 (1803)—photograph of type in Gray Herb. *S. natans*, var. *lorata* Chapm. Fl. So. U. S. 449 (1860), in part only.—Leaves ribbon-like or with dilated lanceolate to ovate blades up to 4 cm. long and 2 cm. broad, the obtuse phyllodia 1–3 dm. long and 3–6 mm. broad, often overtopped by the scape (1–4 dm. long); inflorescence 3–10 cm. long, the 1–3 recurving pistillate pedicels 0.5–3.5 cm. long.—Shallow pools along the coast, Florida to southeastern Virginia.

Var. GRACILLIMA (Wats.) J. G. Smith in Mem. Torr. Bot. Cl. v. 26 (1894) and N. Am. Sp. Sagittaria and Lophotocarpus, 19, pl. 14 (1894). *S. natans* Michx., var. (?) *gracillima* Wats. in Gray, Man. ed. 6: 556 (1890).—Very elongate, up to 1 m. or more long, and submerged; leaves (phyllodia) prolonged, 1–3 mm. wide; scape prolonged; inflorescence 1–3 dm. long, with 2–4 very remote whorls; bracts (at least of the upper whorl) subherbaceous, elongate, mostly caudate-tipped, nearly distinct, 6–10 mm. long; pedicels all elongate, the lower with pistillate flowers, arched or spreading, 0.3–2 dm. long, not much thickened; fruit unknown.—Deep water of streams, eastern Massachusetts to southeastern Pennsylvania.

Var. **lorata** (Chapm.), comb. nov. *S. natans* Michx., var. *lorata* Chapman, Fl. So. U. S. 499 (1860) in great part. *S. lorata* (Chapm.) Small in No. Am. Fl. xvii[1]. 52 (1909), as to type.—The coarsest extreme; phyllodia 0.8–1.5 cm. broad, 2–9 dm. long; inflorescence with 3–6 whorls; sepals relatively large; fruiting head up to 1 cm. in diameter; achenes 2–2.5 mm. long, with 5–7 crests.—Brackish waters, Florida.

The somewhat mystifying bibliography in the treatment in the North American Flora gives the type locality of *Sagittaria lorata* (Chapm.) Small as "Carolina". Chapman, in originally publishing *S. natans*, var. *lorata*, upon which *S. lorata* rests, said "Brackish water, along the west coast of Florida". On the same page in the North American Flora, in the synonymy of typical *S. subulata*, we get the following entry: "*Sagittaria natans lorata* A. Gray, Man. ed. 5. 494. 1867". Search for the latter combination fails to reveal it; but the combination, *S. subulata natans* (Michx.) J. G. Smith, properly published by Smith in his monograph of the genus (1894) failed to win citation in the North American Flora.

S. Weatherbiana Fernald in Rhodora, xxxvii. 387, pl. 385 and 386, fig. 1 (1935).

In summer the broad phyllodia are mostly shriveled, though conspicuous in early spring. On October 12, we found the plants of pools in the Great Dismal Swamp with completely shriveled mature foliage but with newly developing phyllodia of extraordinary beauty, with the whole breadth or a wide central band filled by large lacunae, in this suggesting the foliage of *Potamogeton epihydrus*. It is evident that *S. Weatherbiana* makes its principal growth from autumn to spring, as do *Hottonia inflata* and some other aquatics. See pp. 359 and 400.

Vallisneria americana Michx. To the station recorded in 1936 add another, also in Princess Anne County: abundant on sandy bottom of Back Bay (depth slightly more than 1 m.), Long Island, no. 10,881. See p. 387.

Anacharis densa (Planch.) Victorin. To the station in Dinwiddie County reported in 1938 add one in James City County: pool in cypress swamp back of Chickahominy River, below Barrat's Bridge (or Ferry), no. 11,221.

Diplachne maritima Bicknell. Princess Anne County: inner border of brackish to fresh marsh along Back Bay, at eastern margin of Long Island, no. 10,522; shallow pools in

brackish to fresh marsh along Back Bay, east of Munden, no. 10,833; similar habitat east of Creeds, no. 10,884. See pp. 370 and 387.

Glyceria arkansana Fern. To the stations in Greensville and Surry Counties recorded in 1938 add the following. Sussex County: wooded bottomland, Three Creek, southwest of Grizzard, no. 10,128; bottomland swamp, Nottoway River, southwest of Homeville, no. 10,129. Greensville County: wooded bottomland of Fontaine Creek, southeast of Taylor's Millpond, no. 10,127. See p. 360.

Eragrostis hypnoides (Lam.) BSP. Local range extended eastward to the Blackwater valley. Nansemond County: sandy border of rill in swampy woods east of Milk Landing, south of South Quay, no. 11,223.

E. peregrina Wiegand. Range extended southward to Princess Anne County: roadside, open muddy and sandy shore of Back Bay, east of Creeds, no. 10,891. Southampton County: railroad yards and waste places, Franklin, no. 10,886.

E. hirsuta (Michx.) Nees. To the station in Arlington County (see Rhodora, xli. 500) add one in Dinwiddie County: large clumps in cinders of freight-yard of Norfolk and Western Railroad, Petersburg, no. 10,892.

The typical southern plant with strongly hirsute sheaths. See p. 390.

Arundo Donax L. To the station in Sussex County reported in 1938 add one in Essex County: woods bordering sandy beach of Rappahannock River at Richmond Beach, southeast of Tappahannock, no. 11,527, plants 10–15 feet high. See p. 402.

Triodia Chapmani (Small) Bush. Southampton County: dry white sand of clearings in oak and pine woods bordering Assamoosick Swamp, south of Sebrell, no. 10,894; border of sandy woods near Three Creek, northwest of Carey Bridge, no. 11,222. See pp. 378, 383 and map 15.

Extension inland from Nansemond County. Experience in the field, now extending over several years, indicates that *T. Chapmani* is abundantly distinct from *T. flava*. Hitchcock treated it as inseparable, but in 1934, Griscom and I, finding it in the sandy woods back of Cape Henry, recognized it as at least varietally separable, *T. flava*, var. *Chapmani* (Small) Fernald & Griscom, in Rhodora, xxxvii. 133 (1935). Subsequent observations show that, whereas the wide-ranging *T. flava* (L.) Hitchc. prefers relatively good soil and is inclined to follow roadsides, *T. Chapmani* is restricted to sandy pinelands and oak-scrub. It not only has the spikelets long-stalked; its very

narrow leaves are bluish-green, 5–7 mm. broad, and strongly inclined to become inrolled. Its open and skeleton-like panicle has the bases of the principal branches surrounded by ring-like pulvini with very long hairs, whereas the denser panicle of *T. flava* has the shorter hairs confined to the upper sides of the axils of the branches. *T. Chapmani* reaches its northernmost limit, apparently, in the sands of southeastern Virginia.

*SPOROBOLUS ASPER (Michx.) Kunth. NEW KENT COUNTY: steep sandy bank of York River, near mouth of Fillbate's Creek, north of Holly Forks, no. 11,525. See p. 400.

Hitchcock (*Manual*) indicates no station in the Atlantic States south of northern Maryland.

SPARTINA CYNOSUROIDES (L.) Roth. JAMES CITY COUNTY: fresh tidal marsh of Chickahominy River, below Barrat's Bridge (or Ferry), no. 11,236.

Noteworthy as an extension inland beyond the saline shores. See the two following.

S. ALTERNIFLORA Loisel., var. PILOSA (Merr.) Fern. Inland to CHARLES CITY COUNTY: sandy tidal margin of Chickahominy River, Ferry Point, no. 10,911.

S. PATENS (Ait.) Muhl., var. JUNCEA (Michx.) Hitchc. Inland to CHARLES CITY COUNTY: sandy beach of James River southeast of Tettington, no. 11,235. See p. 396.

In dry fresh sand, associated with plants of strictly fresh habitats.

LEERSIA LENTICULARIS Michx. CHARLES CITY COUNTY: bottomland woods by Chickahominy River, north of Roxbury, no. 11,238. NEW KENT COUNTY: similar habitat, north of Long Bridge, southeast of Quinton, no. 11,239. NANSEMOND COUNTY: border of gum swamp at margin of Great Dismal Swamp, southeast of Whitemarsh School, no. 11,521. See pp. 397 and 400.

In view of Hitchcock's map, indicating no station in the Atlantic States north of South Carolina, and our records of it from Greensville and Southampton Counties (RHODORA, xxxix. 348, 353, 382 and map 22 (1937)), the stations in New Kent and in Nansemond Counties constitute notable local extensions of range.

PASPALUM URVILLEI Steud. To the stations in Warwick and Nansemond Counties reported in 1939 add the following. NANSEMOND COUNTY: roadside ditch east of Suffolk, no. 10,917. SUSSEX COUNTY: roadside ditch southeast of Wakefield, no. 10,918.

It is evident that this species is rapidly spreading northward.

Panicum caerulescens Hackel. Range extended inland to Southampton County: sphagnous swampy woods southwest of Applewhite Church, no. 10,104.

*P. cryptanthum Ashe. Southampton County: bushy swales and borders of swampy woods near Blackwater River, Cobb's Wharf, no. 10,931. See pp. 364 and 383.

One of the rarest members of the genus, heretofore unknown between the region of Wilmington, North Carolina, and southern New Jersey. Near Cobb's Wharf (just north of the North Carolina line, on the west bank of the Blackwater River) there are several very large clumps. One-half of such a plant, broken into fragments, made 30 full sheets of representative material. The station, unfortunately, is within a rod or two of a plowed field.

P. capillare L. New Kent County: ditch at border of damp woods, near Fillbate's Creek, north of Holly Forks, no. 11,519.

The first time we have met this elsewhere usually common species on the Coastal Plain of Virginia.

P. agrostoides Spreng., var. condensum (Nash) Fernald. Tidal shores of James River, forming dense clumps up to 1.8 m. tall, with wide-branching panicles up to 3 dm. long and 1–1.5 dm. broad (several nos.). See pp. 286 and 391.

Just such plants from tidal shores all the way to Texas are referred in the Gray Herbarium by Hitchcock & Chase to *P. agrostoides*. I can get no satisfaction in separating them from *P. condensum* Nash. They have the longer spikelet of that plant, also the firmer foliage with broader midrib. Along the James these very tall clumps with panicles much exceeding the "rarely more than 5 cm. wide" of Hitchcock's *Manual* form thickets at high-tide limit. Farther out, they pass into an outer band (as at Wilcox Wharf, for instance) with plants down to 6 dm. high and with dense lance-ellipsoid panicles only 3–4 cm. thick. These are *P. condensum* as defined by the above authors, but they are clearly small individuals of the coarser plants which form part of the series of specimens listed by Hitchcock & Chase as "intermediate between *P. agrostoides* and *P. condensum*". Unfortunately some of the specimens cited by them as intermediate do have the coarse habit of the tall plants of the James and short spikelets which I cannot distinguish from those of *P. agrostoides*. If *P. agrostoides* and *P. condensum* are distinct

species, I shall welcome having their morphological distinctions pointed out.

ECHINOCHLOA COLONUM (L.) Link. JAMES CITY COUNTY: tidal shore of Back River, opposite Jamestown Island, no. 10,939.

The only time we have met this species, although Hitchcock (*Man.*) gives Virginia as its northeastern limit. Wiegand in his study of *The Genus Echinochloa in North America*, RHODORA, xxiii. 49–65 (1921), cited it from South Carolina southward and westward. See p. 385.

*E. PUNGENS (Poir.) Rydb. (*E. muricata* (Michx.) Fern.). NANSEMOND COUNTY: roadside bordering sandy and sphagnous margins of thickets in pineland southwest of Marsh Hill School, south of South Quay, no. 11,242.

Not seen from Virginia by Wiegand, l. c.

*E. WALTERI (Pursh) Nutt., forma LAEVIGATA Wiegand. (*E. longearistata* Nash). PRINCESS ANNE COUNTY: open muddy and sandy shore of Back Bay, east of Creeds, no. 10,940. SOUTHAMPTON COUNTY: swaley tidal shore of Nottoway River, Knight's Seine Beach (Battle Beach), no. 10,938. See p. 383.

Wiegand cites no material from Virginia; Nash gave the range, "South Carolina to Louisiana."

*SETARIA VIRIDIS (L.) Beauv., var. WEINMANNI (R. & S.) Beauv. PRINCE GEORGE COUNTY: cinders of freight-yard of Norfolk and Western Railroad, east of Petersburg, no. 11,240.

F. T. Hubbard, in his *Taxonomic Study of Setaria italica and its immediate Allies*, Am. Journ. Bot. ii. 169–198 (1915), cited no material from south of New England.

*ANDROPOGON (§ SCHIZACHYRIUM) **praematurus,** sp. nov. (TAB. 626, FIG. 1–3), ab *A. scopario* recedit planta dense cespitosa 3–9 dm. alta; racemis 1–3 cm. longis 3–7-articulatis longe pedunculatis pedunculis filiformibus valde exsertis; rhachi undulato internodiis 3–5 mm. longis superne barbatis; spiculis sessilibus 5–7 mm. longis; spiculis pedicellatis saepe bene evolutis solitariis plerumque masculis 3.5–7 mm. longis.—Dry open woods, clearings and fields, southeastern VIRGINIA: dry gravelly soil northwest of Grove, York County, June 21, 1922, *L. F. & Fannie R. Randolph,* no. 353, as *A. scoparius* (in anthesis); dry sandy pine woods about 3 miles southeast of Petersburg, on headwaters of Blackwater River, Prince George County, June 25, 1936, *Fernald, Long & Smart,* no. 5593, as *A. scoparius*, var. *divergens* (in anthesis); dry fields and roadsides south of Petersburg, Dinwiddie County, June 8, 1938, *Fernald & Long,* no. 8094 (in an-

thesis); argillaceous field near Century House, northeast of Burgess, Dinwiddie County, September 13, 1937 (shattered), *Fernald & Long*, no. 7310; June 17, 1938 (in anthesis) *Fernald & Long*, nos. 8095 (foliage green) and 8096 (glaucous); border of dry woods near Assamoosick Swamp, about 2 miles northeast of Homeville, Sussex County, August 24, 1938, *Fernald & Long*, no. 8922 (fruit scattered); hickory and oak woods and clearings east of Skipper's, Greensville County, June 12, 1939 (in anthesis), *Fernald & Long*, no. 10,092 (TYPE in Herb. Gray.). SOUTH CAROLINA: grass-sedge bog or savannah, 1 mile west of Chicora, July 24, 1939 (shattered), *R. K. Godfrey & R. M. Tryon, Jr.*, no. 844.

Andropogon praematurus (see p.), when first found by us in June, 1936, at once challenged interest because of its extraordinary flowering season. Subsequently we have seen much of it, the plant consistently flowering from early June through the month (presumably into early July) but the inflorescences become quite shattered and the fruit scattered by August. *A. scoparius* and its varieties are autumn-flowering plants, in eastern Virginia very immature in September and in their prime through October. In *A. scoparius* the culms are mostly 0.5–1.5 m. high, the leaves 3–6 mm. wide, the racemes 3–7 cm. long, and the pedicels at each node are paired and truncate or terminated by a sterile rudiment. The early-summer *A. praematurus* is usually only 3–6 dm. high, though exceptional woodland colonies may reach a height of 9 dm.; its leaves are mostly 2–4 mm. broad; the racemes only 1–3 cm. long, with internodes only 3–5 mm. long. Most remarkable, the sessile perfect spikelets, instead of being accompanied by a pair of truncate bearded pedicels or these terminated by mere rudiments, usually are accompanied by a single well developed staminate pedicelled spikelet (FIGS. 2 and 3), though the terminal group may have 2 pedicelled spikelets. In well developed plants these characters are conspicuous; in some, however, only a few well formed staminate spikelets develop. All specimens display some of them and no second pedicel (except the terminal group).

Andropogon praematurus thus belongs in the remarkable group of species which retain well developed pedicelled staminate spikelets, these species being presumable ancestral types in which the pedicelled spikelets have not become reduced to mere

Photo. H. G. Fernald.

ANDROPOGON PRAEMATURUS: FIG. 1, TYPE, × ½; FIG. 2, raceme, × 1, from TYPE; FIG. 3, upper half of raceme, × 5, from TYPE.
A. DIVERGENS: FIG. 4, raceme, × 1.
A. MARITIMUS: FIG. 5, raceme, × 1.

rudiments or to truncate bearded pedicels, but in the three American species with this character the pedicelled spikelets are mostly solitary, instead of paired. The new species can not, however, be placed with either of the other North American species with the solitary pedicelled spikelets staminate. *A. divergens* Anderss.[11] is a coarser endemic of Texas, 0.8–1.5 m. high, with scarcely or barely exserted racemes (our FIG. 4) 3–4 cm. long, the internodes of the rachis 4.5–7 mm. long, the sessile spikelets and the pedicelled staminate ones 6–8 mm. long. The three sheets of it before me (*Cory*, nos. 25,510, 25,840 and 26,064) were all collected in October. *A. praematurus* is certainly very closely related to it, but it differs in its much lower stature, its long-exserted racemes with internodes only 3–5 mm. long, the spikelets mostly smaller. These differences, associated with the pronounced difference in flowering season and the geographic isolation, sufficiently distinguish *A. praematurus*.

From *Andropogon maritimus* Chapm., of the coast of the Gulf of Mexico, *A. praematurus* is abundantly distinct. *A. maritimus* is a stout and stoloniferous non-cespitose species with conspicuously distichous divergent leaves, racemes (FIG. 5) partly included and 4–6 cm. long, the spikelets 8–10 mm. long.

Whether the break in the range of *A. praematurus* (Southeastern Virginia, reappearing in southeastern South Carolina) is an actual one may be doubted. It is probable that the species occurs also in southeastern North Carolina, a region sharing many of the peculiar plants of Southeastern Virginia.

In PLATE 626, FIG. 1 is the type of *Andropogon praematurus*, × ½; FIG. 2, a raceme, × 1, from the TYPE; FIG. 3, upper half of raceme, × 5, from TYPE; FIG. 4, raceme, × 1, of *A. divergens* Anderss., from near Alba, Texas, *Cory*, no. 25,510; FIG. 5, raceme, × 1, of *A. maritimus* Chapm., from Horn Island, Mississippi, *Tracy*, no. 3786.

*A. VIRGINICUS L., var. GLAUCUS (Muhl.) Hack. (*A. capillipes* Nash). NANSEMOND COUNTY: dry white sand of pine barrens, east of Cox Landing, south of South Quay, no. 10,943. See pp.

[11] *Andropogon maritimus* and *A. divergens* were treated by Hackel as *A. scoparius* Michx., subsp. *maritimus*, α. *genuinus* and β. *divergens*, Hackel, Androp. (in DC. Mon. Phan. vi.), 385 (1889), the subspecies distinguished by the staminate pedicelled spikelets. Var. *divergens* was based upon a specimen from Texas which bore the herbarium name *A. divergens* Anderss., published in synonymy by Hackel. Taken up as a species its author is Andersson ex Hackel in syn., not *A. divergens* (Hackel) Anderss., the authorship ascribed to it by Hitchcock. Andersson died nine years before his manuscript name was published by Hackel. In RHODORA, xxxvii. 143, 144 (1935), Griscom and I wholly misinterpreted *A. divergens*. The plant there called by us *A. scoparius*, var. *divergens* is var. *polycladus* Scrib. & Ball.

First from north of southern North Carolina.

A. virginicus, var. tetrastachyus (Ell.) Hack. To the single recorded Virginian station (at Cape Henry; see Fernald & Griscom in Rhodora, xxxvii. 142) add two in Nansemond County: seeping bank of ditch at margin of woods, about 2 miles southeast of Cleopus, no. 9513; dry white sand of pine barrens, east of Cox Landing, south of South Quay, no. 10,944.

Andropogon virginicus L., var. hirsutior (Hackel) Hitchc., forma **tenuispatheus** (Nash), comb. nov. *A. glomeratus tenuispatheus* Nash in Small, Fl. Se. U. S. 61 (1903). *A. tenuispatheus* (Nash) Nash in N. Am. Fl. xvii. 113 (1912). *A. virginicus* var. *tenuispatheus* (Nash) Fernald & Griscom in Rhodora, xxxvii. 142 (1935).

Forma *tenuispatheus* seems to be only a glabrous form of the hirsute-sheathed var. *hirsutior.* In making the transfer of the name *tenuispatheus* as a variety to *A. virginicus,* with var. *hirsutior* as a hirsute form, *A. virginicus,* var. *tenuispatheus,* forma *hirsutior* (Hackel) Fern. & Grisc. l. c. (1935), Griscom and I overlooked the fact that as a varietal name *A. macrourus,* γ. *hirsutior* Hackel (1889) has priority over *A. glomeratus tenuispatheus* Nash (1903).

(*To be continued*)

A Peloric Flower in Gerardia tenuifolia.—Some years ago a specimen of *Gerardia tenuifolia* with a greatly enlarged and deformed terminal flower was found at Woodstock, Connecticut, by Mrs. Clarence Dextrase and brought to me. I laid it aside, hoping to visit the colony from which it came. This I have not been able to do; but the case of peloria seems worth recording.

In my specimen, now in the Gray Herbarium, all the flowers are normal except the terminal one on the main stem. In it, all the parts are doubled; there are ten calyx-lobes, ten stamens and two pistils. These organs, so far as can be determined without dissection, are normally developed, or nearly so. The corolla, however, not only has twice the usual number of lobes, but is split down one side and opened out, forming a somewhat irregular, nearly rotate perianth 3 cm. in diameter.

Similar pelorias have been reported by Penzig (Pflanzen-Teratologie, ed. 2, iii. 111, 115) in *Digitalis* and *Penstemon.* They seem not to have been previously recorded in *Gerardia.*

In *Digitalis,* the polymerous flower tends to take on the character of a shoot, even developing rudimentary secondary flowers in the axils of separated calyx-lobes or other organs. No such tendency appears in the *Gerardia.*—C. A. Weatherby, Gray Herbarium.

Vascular Plants of Eastern Arctic Canada.[1]—Part I of Dr. Nicholas Polunin's "Botany of the Canadian Eastern Arctic" is a welcome addition to the small group of truly comprehensive papers on the boreal American flora. It will be indispensable to anyone concerned with the plant geography or systematic botany of the American arctic. Part I contains the vascular plants, and according to the Foreword Part II will be on fungi, lichens and mosses, Part III on vegetation and ecology, and Part IV on the "Subarctic Regions." The area involves all land "north of the 60th parallel of latitude and east of longitude 95 degrees west, with the exception of Axel Heiberg Island, Boothia peninsula, and the inland parts of Keewatin." The volume begins with a brief account of the history of exploration and a rather comprehensive list of localities from which plant materials are available. The author estimates having seen between 50,000 and 60,000 specimens, scattered among the principal American and European herbaria. The separate specific entities enumerated total 297, to which are added a considerable number of geographic varieties and minor forms. As in most arctic regions, the families most heavily represented are the *Gramineae, Cyperaceae,* and *Compositae.* Fourth in the list are the *Caryophyllaceae.* Following the detailed enumeration of the species there is a summary list with a tabular arrangement of geographic distribution within the area. A large bibliography and a plant-index close the volume.

Dr. Polunin's treatment of the difficult and polymorphic arctic species-complexes is essentially conservative. He has not shown a tendency to "split" excessively, but has given ample recognition to lesser taxonomic units such as varieties and forms. He maintains, throughout his nomenclature, the concept of "Linnaean" species with geographic and other subdivisions of minor rank. Under each species in the catalogue there are only such synonyms as are required to make the list workable with other current papers touching the region. Then comes a brief critical discussion of variations and related matters of systematic interest. The geographic and habitat data are divided into "general distribution," "arctic distribution," "occurrence," and finally a list of cited specimens arranged in a geographic sequence. Four new species, 10 new varieties, and 9 new forms are described.

The book will be valuable not only because it brings up to date the listing of available specimen-material for the study of eastern arctic botany, but also because it contains a remarkably complete survey of the recent literature of the subject. Anyone attempting critical studies of boreal American groups will appreciate this, for the taxonomic literature on our boreal flora has become exceedingly voluminous and

[1] *Botany of the Canadian Eastern Arctic,* by Nicholas Polunin. *Part I. Pteridophyta and Spermatophyta.* National Mus. of Canada Bull. No. 92 (Biol. Ser. No. 24). pp. 1–408. map. 1940.

difficult to assemble. One could wish that the book contained keys and brief diagnoses which could be used for identification of specimens. There are those who will be critical of the voluminous discussions, which contain all sorts of odd bits of information about the plants and their habitats as well as about the author's personal reactions to them. To such critics the reviewer recommends that they read and be entertained as well as enlightened. When Dr. Polunin was at the Gray Herbarium, we had long arguments about how this book should be written, the present writer holding out for a condensed, telegraphic style. He can now admit only pleasure and satisfaction from reading Dr. Polunin's delightful purveyance of the opposite.—Hugh M. Raup, Arnold Arboretum.

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JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 42. November, 1940. No. 503.

A CENTURY OF ADDITIONS TO THE FLORA OF VIRGINIA

M. L. Fernald

(*Continued from page 416*)

*Cyperus rivularis Kunth, forma elutus (C. B. Clarke) Kükenth. James City County: tidal marsh along Powhatan Creek, north of Jamestown Island, no. 10,946; similar habitat, Gordon Creek, east of Barrat's Bridge (or Ferry), no. 11,260.

Apparently all the plants of tidal estuaries from southern Maine southward belong to forma *elutus*, with nearly colorless scales. The type of var. *elutus* C. B. Clarke, was from Pennsylvania, without designation of locality. In the tidal marshes the form becomes very tall (up to 6 dm. high). See p. 394.

C. haspan L., var. americanus Boeckeler. Tidal estuaries of the James and the Chickahominy and tributary creeks inland to Charles City and New Kent Counties, also tidal marshes of Back Bay (many nos.). See pp. 376 and 386 and map 9.

American variety of a pantropical type, reaching essentially equivalent latitudes north and south of the Equator in North and South America.

C. globulosus Aublet.

This adventive species, rapidly spreading as a weed, often forms dense carpets in dooryards, where, mowed at frequent intervals, it maintains a good, green carpet through the midsummer heat. It thus becomes an uninvited "lawn grass" of some value.

*C. brevifolius (Rottb.) Hassk. (*Kyllinga brevifolia* Rottb.). James City County: fresh tidal marsh of Chicka-

hominy River, below Barrat's Bridge (or Ferry), no. 11,266. See p. 395 and MAP 21.

First known area north of Georgia, except that on the lower Delaware. Like *Cyperus haspan* (see above), *C. brevifolius* is a pantropical type, with dispersal which suggests great antiquity, although in some areas it is evidently a recent adventive; and, like *C. haspan* var. *americanus*, its eastern American limits north and south of the Equator are in equivalent latitudes.

Eleocharis tenuis (Willd.) Schultes, var. verrucosa Svenson. To the station in Dinwiddie County, recorded in 1938, add one in Greensville County: peaty swale by Southern Railway, northeast of Emporia, no. 10,137. See p. 360.

Dichromena colorata (L.) Hitchc. To the station recorded in Rhodora, xxxix. 396, add another, also in Princess Anne County: inner border of brackish to fresh marsh along Back Bay, at eastern margin of Long Island, no. 10,539. See pp. 370 and 371.

Psilocarya scirpoides Torr., var. Grimesii Fern. & Grisc. in Rhodora, xxxvii. 154, pl. 344 (1935). To the two original stations add a fine one in Nansemond County: seepy sandy and peaty open spots in sphagnous savannah-like swale east of Cherry Grove, south of South Quay, no. 11,530. See p. 384.

Bulbostylis ciliatifolius (Ell.) Fernald in Rhodora, xl. 391 (1938). Local range extended northward in Southampton County and eastward into Nansemond County (many nos.). See pp. 362 and 379.

Scirpus debilis Pursh. Dinwiddie County: springy sphagnous swale about 5 miles east of Burgess Station, no. 10,970.

South of the Potomac chiefly a plant of the interior of the State. We have met it nowhere else on the Coastal Plain. See p. 390.

S. atrovirens Muhl., var. flaccidifolius Fern. in Rhodora, xl. 396 (1938). Range extended into Greensville County: wooded bottomland of Fontaine Creek southeast of Taylor's Millpond, nos. 10,140, 10,544. Sussex County: bottomland swamp, Nottoway River, southwest of Homeville, no. 10,141. See p. 359.

By mid-July the over-lopping and drowned inflorescences freely proliferate in the manner of the two following.

S. divaricatus Ell. Local range extended eastward into Nansemond County: border of gum swamp at margin of Great Dismal Swamp, southeast of Whitemarsh School, no. 11,532, old culms prostrate, freely proliferating and rooting at nodes. See p. 400.

S. FONTINALIS Harper, var. VIRGINIANA Fern. in RHODORA, xli. 532 (1939). Range extended northward across the James to JAMES CITY COUNTY: swampy woods along Powhatan Creek, north of Jamestown Island, no. 10,974, old culms arching and trailing, the inflorescences producing many rooting young plants. See p. 386.

ERIOPHORUM VIRGINICUM L. DINWIDDIE COUNTY: springy sphagnous swale about 5 miles east of Burgess Station, no. 10,975. PRINCESS ANNE COUNTY: swampy and inundated woods, north of Blackwater River, no. 3779.

It is not known where Clayton got his material, cited by Gronovius and by Linnaeus, nor the exact geographic source of the plant said to be from Virginia, described and illustrated by Plukenet. The species is frequent along the Blue Ridge and the Appalachian Upland but we have only twice met it on the Coastal Plain, although Britton & Hollick collected it in late September, 1890, in the Great Dismal Swamp in Nansemond County, along "the old canal" from Suffolk, where "masses of *Eriophorum Virginicum* were frequent."—Hollick in Mem. Torr. Bot. Cl. ii. 56 (1890). See p. 390.

*FUIRENA BREVISETA Coville. DINWIDDIE COUNTY: springy sphagnous swale about 5 miles east of Burgess Station, no. 10,976. Extension north from North Carolina. See p. 390.

*RHYNCHOSPORA MACROSTACHYA Torr., var. **colpophila** Fernald & Gale, var. nov., planta 0.8–1.75 m. alta; foliis valde elongatis subflaccidis; achaeniis 3–3.8 mm. latis 5–5.8 mm. longis; tuberculis 1.8–2.3 mm. longis basi 1.8–2.4 mm. latis.—Tidal marshes of the Chesapeake Bay drainage, Maryland and Virginia. MARYLAND: very rare, swamps near Marshall Hall, September 28, 1898, *Th. Holm;* Chesapeake Beach Railroad at Patuxent River, August 27, 1902, *Geo. H. Shull*, no. 283. VIRGINIA: Fairfax County: low wet woods, near Accotink Bay, Camp Humphreys, October 12, 1924, *S. F. Blake*, no. 8915. King William County: fresh tidal shore of Mattaponi River, at Horse Landing, near King William Courthouse, October 14 and 16, 1939, *Fernald & Long*, no. 11,536. New Kent County: fresh tidal marsh by Chickahominy River, at "Shady Rest", southeast of Windsor Shades (Boulevard Postoffice), September 16, 1939, *Fernald & Long*, no. 11,273; open marsh of Chickahominy River, Lanexa, July 30, 1921, *Grimes*, no. 4155. Charles City County: fresh tidal marsh along Kittewan Creek, Weyanoke, September 18, 1939, *Fernald & Long*, no. 11,274. James City County: muddy tidal marsh along Gordon Creek, east of Barrat's Bridge (or Ferry), September 19, 1939, *Fernald & Long*, no. 11,275; tidal

marsh along Powhatan Creek, north of Jamestown Island, August 22, 1939, *Fernald & Long*, no. 10,977. Prince George County: muddy tidal shore of James River, Jordan Point, August 16, 1938, *Fernald & Long*, no. 8983 (TYPE in Herb. Gray). See pp. 386, 393 and 401.

As noted by me in RHODORA, xli. 533 (1939), *Rhynchospora macrostachya* is known on the Coastal Plain of Virginia only from the acid Great Dismal Swamp and from the tidal estuaries entering Chesapeake Bay. The plant of the tidal shores is extraordinarily large, with prolonged and almost flaccid leaves. Miss Shirley Gale, engaged in an intensive study of the genus, has made measurements which give the following contrasts.

Typical RHYNCHOSPORA MACROSTACHYA: plant 4.5 (in dwarf specimens down to 1)–11.3 dm. high, in the Southeast becoming taller; leaves firm, 0.35–1.2 cm. broad; achene 5–5.4 mm. long, 2.6–3.1 mm. broad; tubercle 1.7–2 (rarely –2.2) cm. long, 1–1.8 mm. broad at base.

Var. COLPOPHILA: plant 0.8–1.75 m. high; leaves very long, subflaccid, 0.9–1.5 cm. broad; achene 5–5.8 mm. long, 3–3.8 mm. broad; tubercle 1.8–2.3 cm. long, 1.8–2.4 mm. broad at base.

Var. *colpophila* is a member of the remarkable flora which characterizes the tidal reaches of the Chesapeake, a group of endemic and isolated species specially discussed in Part III.

THE VARIETIES OF RHYNCHOSPORA CEPHALANTHA.—In 1935 I pointed out[12] that the type of *Schoenus axillaris* Lam. (1791), which is the nomenclatural basis of *Rhynchospora axillaris* (Lam.) Britton (1888), can have nothing to do with the plant with subspherical glomerules to which Britton had applied it. I then showed that the first clearly identifiable binomial in this series is *R. cephalantha* Gray in Ann. Lyc. N. Y. iii. 218 (1835); and I took up *R. cephalantha* in the inclusive sense of Gray and recognized *R. microcephala* Britton as a species on account of more numerous and more remote and smaller glomerules of smaller spikelets with smaller achenes with more slender tubercle.

During the summer and autumn of 1938 and again in 1939 Mr. Long and I were much perplexed by the series, for it was noted that in bogs where deep sphagnum prevails plants very close to typical New Jersey *R. cephalantha* occur, but that in inundated pinelands and shallow pools there is a much coarser plant, with achenes and spikelets of *R. cephalantha*, the glomer-

[12] Fernald in RHODORA, xxxvii. 403–405, plate 391 (1935).

ules tending to be very numerous and remote and the broad leaves remaining flat, whereas typical *R. cephalantha* has the narrow leaves soon becoming involute and the few glomerules less scattered. Miss Shirley Gale has joined me in a detailed study of the series and we are recognizing two well defined varieties of *R. cephalantha*. See p. 366.

*R. CEPHALANTHA Gray, var. **typica** Fernald & Gale. *R. cephalantha* Gray in Ann. Lyc. N. Y. iii. 218, as to plant of Torrey from New Jersey and Long Island (1835); Torrey, Fl. N. Y. ii. 365 (1843); Gray, Man. 533 (1848); Fernald in RHODORA, xxxvii. 404, pl. 391, figs. 2 and 3 (1935). *R. axillaris* Britton in Bull. Torr. Bot. Cl. xv. 104 (1888) as to plant, in part, not as to name-bringing synonym, *Schoenus axillaris* Lam.—Culms 5.7–9 dm. high; leaves 1.5–2.5 (–3) mm. broad, tending to become strongly inrolled in drying; glomerules chiefly confined to the summit or the upper fifth of the culm, terminal or in 1 or 2 (rarely 3) upper axils, the lowest then 2–10 (–15) cm. apart; mature glomerules 1.5–2 cm. in diameter; spikelets castaneous to blackish-fuscous, 5–6 mm. long; achenes 2–2.4 mm. long, 1.4–1.6 mm. broad; tubercle 1.8–2.4 mm. long; bristles 3.8–4.8 mm. long.—Wet pine barrens and bogs, Long Island, New Jersey and Delaware; southeastern Virginia, eastern North Carolina and southeastern South Carolina. The following are the more southern specimens. VIRGINIA: argillaceous and siliceous boggy depression southeast of Petersburg, at head of Poo Run, Prince George County, June 19, 1936, *Fernald, Long & Smart*, no. 5661, with scattered glomerules (as *R. microcephala*), July 18, 1936, *Fernald & Long*, no. 6090 (distributed as *R. microcephala*); sphagnous argillaceous boggy depression just northwest of Wakefield, Sussex County, September 11, 1937, *Fernald & Long*, no. 7352 (as *R. microcephala*); sphagnous bog about 1 mile northeast of Dahlia, Greensville County, July 15, 1938, *Fernald & Long*, no. 8610, August 20, 1938, *Fernald & Long*, no. 8993. NORTH CAROLINA: sphagnous bog at Method, Wake County, July 13, 1938, *R. K. Godfrey*, no. 4985 (transition to var. *pleiocephala* in its distant glomerules); drainage ditch at Carolina Beach, New Hanover County, June 24, 1938, *Godfrey*, no. 4719 (broad leaves of var. *pleiocephala*); savannah 12 miles north of Jacksonville, Onslow County, August 6, 1938, *Godfrey*, no. 5756: savannah 5 miles east of Jacksonville, Onslow County, August 6, 1938, *Godfrey*, no. 5808. SOUTH CAROLINA: grass-sedge bog or savannah, 12 miles north of Georgetown, Georgetown County, August 2, 1939, *Godfrey & Tryon*, nos. 752a, 1061; drainage ditch, 3 miles north of McClellanville, Charleston County, July 19, 1939, *Godfrey & Tryon*, no. 677.

Much of the material from southeastern Virginia has 3 or 4 remote glomerules, whereas 2 glomerules are more general in New Jersey. Plants with only 2 glomerules occur, however, in Virginia and exceptional New Jersey specimens show 1, 3 or 4.

*Var. **pleiocephala** Fernald & Gale, var. nov., culmis crassis 0.6–1.2 m. altis; foliis planis 2.5–4.5 mm. latis; inflorescentiis 1.4–5 dm. longis, glomerulis axillaribus 4–7 remotis 1.2–2 cm. diametro, imis 0.6–1.8 dm. distantibus; spiculis fulvis vel castaneis 5 mm. longis; achaeniis 2.1–2.5 mm. longis 1.4–1.6 mm. latis; tuberculis 1.4–2.2 mm. longis; setis 3–4.4 mm. longis.—Swamps, pond-holes, wet pinelands and ditches, southeastern Virginia to Florida and Louisiana. VIRGINIA: abundant and dominating an exsiccated argillaceous pond-hole in woods, about 1 mile south of Mercy Seat Church, Surry County, August 23, 1938, *Fernald & Long*, no. 8994 (TYPE in Herb. Gray), October 15, 1938, *Fernald & Long*, no. 9549: dominant in flat sphagnous pineland, Collier's Yard, 3–4 miles southwest of Petersburg, Dinwiddie County, July 16, 1939, *Fernald & Long*, no. 10,548; same station, August 17, 1939, *Smith & Hodgdon* in Pl. Exsic. Gray.; pond-hole in pine and oak woods near Three Creek, north of Emporia, Greensville County, September 9, 1938, *Fernald & Long*, no. 9283. NORTH CAROLINA: pineland at Nakina, Columbus County, August 29, 1938, *R. K. Godfrey*, no. 6347; low pineland at Dunn, Harnett County, August 25, 1938, *Godfrey*, no. 6122; without stated locality (presumably near Wilmington), *M. A. Curtis;* ditches near Wilmington, July 2, 1897, *Biltmore Herb.*, no. 279[a]. SOUTH CAROLINA: Santee Canal, August, ——, *Ravenel* (as *R. cymosa*); sandy drainage ditch, 2 miles west of Salters, Williamsburg County, July 14, 1939, *Godfrey & Tryon*, no. 504; gum-swamp depression in savannah, 15 miles north of Georgetown, Georgetown County, June 24, 1939, *Godfrey & Tryon*, no. 62; grass-sedge bog or savannah, 12 miles north of Georgetown, August 2, 1939, *Godfrey & Tryon*, no. 752; shallow peaty pond in pine barren, 9 miles north of Georgetown, July 21, 1939, *Godfrey & Tryon*, no. 759; boggy ditch in pine barrens, 2 miles east of Meggett, Charleston County, July 16, 1927, *Wiegand & Manning*, no. 582 (as *R. axillaris*); drainage ditch, 3 miles north of McClellanville, Charleston County, July 19, 1939, *Godfrey & Tryon*, no. 675. GEORGIA: Waycross, August 18, 1909, *H. A. Lang* (Phil. Acad.); wet meadow, Leslie, Sumter County, August 17, 1900, *Harper*, no. 413 (as *R. axillaris*). FLORIDA: low "rich" places, near Jacksonville, August ——, *Curtiss*, no. 3144; swampy places in pine barrens near Jacksonville, June 18, 1894, *Curtiss*, no. 5016 (as *R. axillaris*); cypress swamp, vicinity of Eustis, Lake County, May 16–31, 1894, *Nash*, no. 845 (as *R.*

axillaris); swamp, Okeechobee region, Brevard County, May 14, 1903, *Fredholm*, no. 5821 (as *R. fascicularis*); swamp on prairie, Okeechobee region, October 29, 1903, *Fredholm*, no. 6175 (as *R. axillaris*); bogs and shady swamps, Apalachicola, July–August, ——, Chapman in *Biltmore Herb.* no. 279[b]. MISSISSIPPI: tidal marsh on Bilox Bayou, Harrison County, September 17, 1885, *Donnell Smith;* Wisdom, June 14, 1897, *Tracy*, no. 3418 (as *R. axillaris*); moist open pine woods, 2 miles west of Bay St. Louis, Hancock County, June 25, 1938, *D. S. & H. B. Correll*, no. 9103. LOUISIANA: low moist grassy soil of open prairie, 3 miles east of Robert, Tangipahoa Parish, July 2, 1938, *D. S. & H. B. Correll*, no. 9317; open pine-land, north of Abita Springs, St. Tammany Parish, August 12, 1912, *Pennell*, no. 4137 (Phil. Acad.).

A single collection from New Jersey (Quaker Bridge, October 12, 1859, *Wm. Boott*) is as coarse as *R. cephalantha*, var. *pleiocephala* but its few glomerules place it nearer var. *typica*. *Godfrey*, no. 4985, from Wake County, and his no. 4719 from New Hanover County, North Carolina (see var. *typica*) are also transitional.

The coarse southeastern plant which we are calling *Rhynchospora cephalantha*, var. *pleiocephala* was recognized by Gray when he originally described *R. cephalantha;* and he gave the latter name rather than the original manuscript *R. biceps* of Torrey because of the southern specimens (from Wilmington, North Carolina, to Florida and Louisiana). The original material which Torrey had designated *R. biceps* and which formed the primary basis of *R. cephalantha* was the plant of the Pine Barrens of New Jersey (and of Babylon, Long Island); the coarser several-headed plant of the South was appended to it by Gray and caused his rejection of Torrey's name. Gray's comment was as follows:

OBS. This interesting species was discovered by Prof. Torrey several years since, in the pine barrens of New Jersey and on Long Island; and as in these localities it occurs, for the most part, with only two heads, it received the name of *R. biceps*. Our specimens from the southern states, however, have uniformly more than two heads, and often six or seven. I have therefore ventured to substitute for the manuscript name of Prof. Torrey, one which is in a good degree characteristic of the species.

Later, however, in 1848, Gray (Man. 533) restricted the range of *R. cephalantha* to "Long Island and New Jersey." We are, therefore, maintaining this more slender extreme of the species as var. *typica*.

*Rhynchospora **chalarocephala** Fernald & Gale, sp. nov. (fig. 1 et 2), planta cespitosa, culmis gracilibus 1.8–8.3 dm. altis; foliis lineari-involutis 1– rare 2 mm. latis imis confertis; glomerulis 3–7 remotis turbinatis vel laxe subhemisphaericis plerumque 2–5-lobatis 0.9–1.8 cm. diametro; spiculis laxe adscendentibus vel explanatis; floribus solitariis; achaenio lenticulari-obovoideo laevi lucido 1.4–1.7 mm. longo 0.9–1 mm. lato marginato basi angustissime attenuato, tuberculo angusto subulato basi quam achaenii apicem valde angustiore 1–1.6 mm. longo; setis 6 retrorse barbellatis tuberculo aequalibus vel id leviter superantibus 2.8–3.8 mm. longis.—New Jersey to South Carolina. New Jersey: wet pine barrens, Sims Place, Burlington County, September 10, 1935, *J. A. Drushel & H. K. Svenson*, no. 6860 (as *R. glomerata*, var. *minor*); Atsion, Burlington County, September 21, 1895, *B. Heritage* (Phil. Acad.); Pleasant Mills, Burlington County, September 24, 1887, *C. A. Gross* (Phil. Acad.); peaty, sandy bank along West Branch of Wading R., Harrisville, Burlington County, July 21, 1932, *Fogg*, no. 4545 (Phil. Acad.); peaty bog, near Beaver Branch of Wading R., southwest of Calico, Burlington County, July 28, 1937, *Long*, no. 50,935 (Phil. Acad.); Parkdale, Camden County, August 17, 1905, *S. Brown*, no. 56 (Phil. Acad.), September 1, 1911, *Pennell*, no. 3570 (Phil. Acad.); peaty and sphagnous pond-hole depression near Hardingville, Gloucester County, August 8, 1935, *Long*, no. 47,134 (Phil. Acad.); Weymouth, Atlantic County, August 15, 1883, *C. A. Gross* (Phil. Acad.); Atlantic Cranberry Meadows, Weymouth, August 26, 1922, *G. W. Bassett* (Phil. Acad.); moist pine barrens, Egg Harbor City, Atlantic County, August 10, 1913, *Mackenzie*, no. 5558 (herb. N. Y. Bot. Gard.); Maurice River flats, east of Vineland, Cumberland County, August 12, 1923, *Bassett & Long* (Phil. Acad.); wet peaty margin of East Creek Pond, East Creek, Cape May County, September 25, 1920, *Long*, no. 23,461 (Phil. Acad.); wet peaty pond-hole about 1 mile west

Rynchospora chalarocephala: fig. 1, achene, × 10; fig. 2, summit of inflorescence, × 1.

R. microcephala: fig. 3, achene, × 10; fig. 4, summit of inflorescence, × 1.

of Bennett, Cape May County, September 26, 1920, *Long,* no. 23,488 (Phil. Acad.); moist sandy and peaty margin of pond-hole northwest of Ocean View, Cape May County, *Long,* no. 25,007 (Phil. Acad.); swamp 1 mile west of Dennisville, Cape May County, August 16, 1925, *R. R. Driesbach,* no. 3869 (Phil. Acad.); swamp, "Head of River", Tuckahoe River, Cape May County, August 23, 1925, *Driesbach,* no. 3982 (Phil. Acad.). DELAWARE: moist soil, Lewes, August 15, 1895, *Commons* (Phil. Acad.). VIRGINIA: without definite locality, *John Ball* (as *R. glomerata,* var.); sandy and peaty border of Cat Pond, south of Benns Church, Isle of Wight County, September 18, 1937, *Fernald & Long,* no. 7357 (distrib. as *R. microcephala*), TYPE in Herb. Gray. NORTH CAROLINA: sandy soil, Beaufort (Cartaret County), August, 1903, *Ruth,* no. 9 (with memorandum, "Seems to be *R. glomerata* but I am not sure of it; the leaves are too setaceous for that"); drainage ditch near Hubert, Cartaret County, August 6, 1938, *Godfrey,* no. 5844 (as *R. glomerata,* exceptionally large plant with several glomerules borne in branching axillary cymes); pineland at Atlantic, Cartaret County, September 1, 1938, *Godfrey,* no. 6427 (as *R. glomerata,* var. *minor*); savannah 8 miles southwest of Jacksonville, Onslow County, September 1, 1938, *Godfrey,* no. 6469 (as *R. glomerata,* var. *minor*); savannah 12 miles north of Jacksonville, August 6, 1938, *Godfrey,* no. 5753 (as *R. glomerata,* var. *minor*); Pender County, September, 1880, *Hyams,* no. 4979 (herb. N. Y. Bot. Gard.); dried-out road-making sand-pit, 4 miles east of Bolton, Columbus County, July 5, 1927, *Wiegand & Manning,* no. 581 (as *R. axillaris*); Southport, Brunswick County, August 13, 1930, *Blomquist* (as *R. microcephala*). SOUTH CAROLINA: shrub-bog, 3 miles east of Georgetown, Georgetown County, July 21, 1939, *Godfrey & Tryon,* no. 774; grass-sedge bog or savannah, 12 miles north of Georgetown, August 2, 1939, *Godfrey & Tryon,* no. 1060; sandy drainage ditch, west of Salters, Williamsburg County, July 14, 1939, *Godfrey & Tryon,* no. 514; marshy border of lake, 8 miles southeast of Columbia, Lexington County, August 8, 1939, *Godfrey & Tryon,* no. 1339; damp soil, Aiken, July 28, 1866, *H. W. Ravenel* (as *R. cephalantha*?). FLORIDA: swamps, Sanford, November 3, 1927, *S. Rapp* (herb. N. Y. Bot. Gard.).

Rhynchospora chalarocephala (from the loose heads) belongs to § *Eurhynchospora,* series *Glomeratae,* having the characteristic "wire-edged" smooth and lustrous umbonate obovoid achene drawn out at base into a pronounced slender stipe. As shown by the original identifications, it has been (often with doubt) placed in *R. glomerata, R. capitellata* (*R. glomerata,* var. *minor*),

R. "axillaris", *R. cephalantha* and *R. microcephala.* Its closest affinity is with *R. microcephala*, since it has the spikelets 1-flowered, *R. glomerata* and *R. capitellata* having two or more florets to each spikelet, or, if with only one true floret, then with one or more terminal rudiments. Its tightly inrolled scales and small achenes also place it with *R. microcephala.* From that species (FIGS. 3 and 4) it is distinguished in gross aspect by the character of the inflorescence. This is composed of 3–7 remote glomerules which are turbinate or subhemispherical at full development. Never tightly compacted, they are often subdivided into a cluster of as many as 5 smaller secondary and mostly approximate fascicles, thus suggesting the inflorescences of *R. glomerata* and *R. capitellata.* As may be deduced from the shape of the fascicles, the spikelets are mainly ascending to loosely spreading, more rarely divergent.

R. microcephala, on the other hand, as shown by the type, kindly placed at our disposal by Dr. A. C. Smith and Mr. Wittrock, and as illustrated in RHODORA, xxxvii. t. 391, figs. 1 and 5 (1935), has the inflorescence normally composed of 4–6 remote globose heads, the spikelets of which are closely compacted, ascending to reflexed, thus presenting a solid aspect. Specimens of *R. microcephala* collected in shaded or unfavorable habitats may simulate *R. chalarocephala*, but in no case do they have the lateral glomerules lobed or forked. The basal leaves also afford a diagnostic character of secondary importance. Those of *R. microcephala* are commonly 1.5–3 mm. broad, and flat. In *R. chalarocephala*, however, they are rarely 2 mm. wide, being usually narrower, even to subfiliform, and usually involute in age. In borderline cases, where the gross appearance of the two species is similar, the identity can be determined by study of the mature achenes. Those of *R. chalarocephala* (FIG. 1), although of the same length and breadth as in *R. microcephala* (FIG. 3) usually have the longer and narrower stipe passing more abruptly to the main body of the achene, which is, therefore, proportionally shorter.

The ranges of *R. microcephala* and *R. chalarocephala* overlap, but their relative distribution varies. The former species, ranging from New Jersey southward along the Coastal Plain, is local in New Jersey but attains a maximum development in south-

eastern Virginia and eastern North Carolina, dwindling, though locally present, in South Carolina, Georgia, Florida, Alabama and Mississippi. *R. chalarocephala* is relatively common at its northern limit in New Jersey and, although we have seen only two collections (one without stated locality) from Virginia, it is apparently common in eastern North and South Carolina. We have found only one collection from Florida.

[Rhynchospora dodecandra Baldw. In Rhodora, xxxix. 328 and 389 (1937), I recorded this species as occurring near the Crater in Prince George County (no. 5652). The material is too young and repeated search has failed to reveal *R. dodecandra* there. Suspecting its identity Miss Gale and I have restudied it. It proves to be very young *Juncus biflorus* Ell., the flower-buds being those of *Juncus*. *Rhynchospora dodecandra* thus drops from the Virginia flora. This misidentification is inexcusable, more absurd than the once reported occurrence of *R. macrostachya* in Vermont, based upon insect-galls on *Juncus canadensis!*]

*R. pallida M. A. Curtis. Nansemond County: sphagnous savannah-like swale east of Cherry Grove, south of South Quay, no. 10,550, forming large stools 1.1 m. high.

The first station between southeastern North Carolina and southern Delaware. See p. 381 and map 14.

R. perplexa Britton. Local range extended to Dinwiddie County: flat pineland, Collier's Yard, 3–4 miles southwest of Petersburg, no. 10,981. Surry County: exsiccated argillaceous pond-hole in woods, about 1 mile south of Mercy Seat Church, no. 8989. See p. 382.

R. distans (Michx.) Vahl. To the single small station in Isle of Wight County, reported in Rhodora, xxxix. 391 (1937), add from Nansemond County: wet peaty pine barrens, east of Cox Landing, south of South Quay, nos. 10,551–10,554, ranging in height from 2 dm. to 1 m.; similar habitat, southeast of Sandy Landing, south of South Quay, no. 10,980. See p. 379.

Carex crus-corvi Shuttlew., var. virginiana Fern. Local range extended into Greensville County: wooded bottomland of Fontaine Creek southeast of Taylor's Millpond, no. 10,154. Southampton County: wooded bottomland of Meherrin River, south of Hugo, no. 10,155.

Both stations within a mile of North Carolina!

C. Frankii Kunth. Local range extended to the coast. Princess Anne County: in low woods along Back Bay, Long Island, no. 10,557. See p. 371.

*C. intumescens Rudge × louisianica Bailey. Plants clearly of this origin, cespitose like *C. intumescens* but with elongate

pistillate spikes suggestive of those of *C. louisianica,* local in Sussex County: wooded bottomland, Jones Hole Swamp, west of Coddyshore, June 18, 1939, no. 10,174.

Arisaema. In view of the revision in Rhodora, xlii. 247–254, plates 598–600, the following are recognized on the Coastal Plain of Virginia.

A. triphyllum (L.) Schott. (*A. pusillum,* forma *pallidum* E. H. Eames). Princess Anne County: rich woods, Great Neck, *Fernald & Griscom,* no. 4351; Little Neck, no. 3822. Prince George County: rich deciduous woods, Coggins Point, no. 9703. Henrico County: dark shady places, University of Richmond, Westhampton, May, 1933, *Harriet M. Walton.* Southampton County: sphagnous pocket in rich deciduous woods northeast of Statesville, no. 8176; rich wooded slopes and spring-heads along Nottoway River, above Carey Bridge, no. 11,799. Type a Clayton specimen from Virginia.

A. triphyllum, forma pusillum (Peck) Fern. Princess Anne County: rich woods, Great Neck, *Fernald & Griscom,* no. 4350. Henrico County: damp woods, Westhampton, April 25, 1935, *Alice Ryland.* Southampton County: rich wooded slopes and spring-heads along Nottoway River, above Carey Bridge, no. 11,800.

[A. atrorubens (Ait.) Blume. Fruiting plants, not showing the fresh spathes, but referable to the species, common. We have seen no typical *A. atrorubens,* with unstriped full-purple hood.]

A. atrorubens, forma zebrinum (Sims) Fern. Prince George County: rich wooded ravine southeast of Hopewell, no. 9702; sandy alluvial woods, bottomland of Powell Creek, Garysville, no. 7785.

*A. atrorubens, forma viride (Engler) Fern. Princess Anne County: damp woods, Virginia Beach, *Fernald & Griscom,* no. 4349. Prince George County: rich deciduous woods, Coggins Point, no. 9704; sandy alluvial woods, bottomland of Powell Creek, Garysville, no. 7784. Sussex County: wooded bottomlands and swampy woods near Nottoway River, east of Stony Creek, no. 8175.

Are two Species passing as Peltandra virginica? On p. 360 I emphasized the marked differences in the freshly flowering material of the more northern and more southern plants which pass as *Peltandra virginica.* The two extremes are striking in fresh condition but, as in most aroids, the herbarium specimens are almost hopeless to make out. I am, therefore, merely

showing photographs of characteristic fresh and passing spathes and a flowering spadix of each, × 1.

PLATE 627 is of the southern plant, common in southeastern Virginia, thence to Georgia. It is characterized by the loosely opening white-margined spathe (FIG. 1) which, at the base of the limb soon becomes deliquescent (FIG. 3), the limb coming squarely off by circumscission. The summit of the orange-yellow spadix (FIGS. 2 and 4) is sterile or only weakly floriferous. The photographs were made from fresh material collected by the Appomattox River at Petersburg, Virginia, in June, 1940.

PLATE 628 is of the northern plant, occurring at least from southern Maine to New Jersey and Pennsylvania. Its greener, though pale-margined spathe (FIGS. 1 and 2) barely opens or is tightly rolled. The limb decays away, leaving a stub at the summit of the fruit (FIG. 3); and the whitish spadix (FIG. 4) flowers to the tip. The photographs are from fresh material collected in June, 1939, by Dr. Lyman B. Smith in Aberjona River, Winchester, Massachusetts.

As stated, I am unable from herbarium material to reach a decision as to the importance of these characters. I merely present the problem, with the hope that many others will carefully watch and most carefully collect the plants from New England southward and westward, recording their observations on the degree of opening of spathe, circumscission or gradual rotting off of the limb, color of spadix and whether it flowers to the tip. If someone will volunteer to collate the material and reach a decision I shall be greatly relieved.

When it is clearly settled whether we have two species or two well defined geographic varieties, the names must be carefully weighed. The Linnean type is now underground and not available and those of Rafinesque are, if preserved, presumably also in European herbaria. Whether they would show more than most existing material in modern herbaria is questionable; but, until they are all traced and carefully considered and it is determined whether the contrasts evident in Virginia and from Pennsylvania to Maine are constant, it is, I feel, premature to make a decision which, at best, would be only tentative and too liable to upset. In 1890 Sereno Watson,[13] stating that

[13] Watson, Proc. Amer. Acad. xxv. 187 (1890).

"Extreme forms received from Mr. A. Commons of Wilmington, Del., seemed to indicate that two species might perhaps be distinguished", went extensively into the matter. He studied the flowers, staminodia, ovaries and their number, and other technical characters from variable fresh material. Besides the Commons material (with both open and tightly rolled spathes) and the Cambridge material, Watson had several lots of specimens (now showing little) sent by J. N. Rose from near Washington. His conclusion was that "a study of the forms growing near Cambridge shows that no division can be safely made". With relatively little experience in the group and a profound ignorance of the more technical characters, I hesitate, as stated, to make a hasty decision.

As to the names, the following must be carefully considered: *Arum virginicum* L. and at least 9 proposed for species by Rafinesque; it must also be determined to which species or variety the formal names proposed by Blake apply. The final solution, I feel, should be deferred until the applications of the 10 specific names and the several formal ones can be satisfactorily determined.

Eriocaulon Parkeri Robinson. To Grimes's station at Lanexa, add the following. King William County: fresh tidal shore of Mattaponi River, at Horse Landing, near King William Courthouse, no. 11,539. New Kent County: fresh tidal marsh by Chickahominy River, at "Shady Rest", southeast of Windsor Shades (Boulevard Postoffice), no. 11,538. Charles City County: sandy tidal shore of James River at "Four Oaks", below Harrison Point, no. 11,282. James City County: tidal mud along Powhatan Creek, north of Jamestown Island, no. 10,988. Nansemond County: muddy tidal margin of Blackwater River, Cox Landing, south of South Quay, no. 11,283. See pp. 386, 391, 399 and 401 and map 17.

The last station is near the head of tide on a river tributary to the Chowan in North Carolina. The plant should confidently be sought in the latter state.

Lachnocaulon anceps (Walt.) Morong. Local range extended eastward into Nansemond County: sphagnous savannah-like swale east of Cherry Grove, south of South Quay, no. 10,563. See p. 381.

Xyris ambigua Beyrich. Local range extended eastward to Nansemond County: sphagnous savannah-like swale east of

Photo. W. H. Hodge.

Peltandra virginica, southern representative (from Virginia), × 1: fig. 1, fresh spathe; figs. 2 and 4, fresh spadices; fig. 3, old spathe, showing deliquescence of base of limb.

Photo. W. H. Hodge.

PELTANDRA VIRGINICA, northern representative (from Massachusetts), × 1: FIGS. 1 and 2, fresh spathes; FIG. 3, old spathe, with limb rotted away; FIG. 4, fresh spadix.

Cherry Grove, south of South Quay, no. 10,567, gigantic stools up to 3 dm. in diameter at base.

*XYRIS CAROLINIANA Walt., forma **flaccida,** f. nov., foliis submersis flaccidis 5–8 mm. latis plerumque 2–4.5 dm. longis translucentibus vel opacis 11–23-nerviis.—Tidal and perhaps other submersed areas, southeastern Pennsylvania, southern New Jersey, eastern Delaware and southeastern Virginia. PENNSYLVANIA: sandy-muddy tidal shore of Delaware River, southeast of Tullytown, Bucks County, September 6, 1927, *Long*, no. 33,786 (Herb. Phil. Acad.). NEW JERSEY: Mullica River, below "the Forks", Atlantic County, August 21, 1910, *Long*, no. 4727; tidal marsh, within 1 mile south of Catawba, along Great Egg Harbor River, August 6, 1937, *Long*, no. 51,208 (TYPE in Herb. Gray, ISOTYPE in Herb. Phil. Acad.). DELAWARE: 2nd mill pond west of Railroad Station, Milford, Sussex County, July 21, 1908, *Long* (Phil. Acad.); shore of Red Mill Pond, near Lewes, Sussex County, August 17, 1923, *J. P. Otis* (Phil. Acad.); sandy ditches near Georgetown, Sussex County, August 26, 1897, *A. Commons* (Phil. Acad.); Millsboro, Sussex County, September 21, 1907, *S. Brown* (Phil. Acad.). VIRGINIA: fresh tidal shore of Mattaponi River, at Horse Landing, near King William Courthouse, King William County, October 14 and 16, 1939, *Fernald & Long*, no. 11,540; completely submerged at high tide, fresh tidal marsh of Chickahominy River, below Barrat's Bridge (or Ferry), James City County, September 19, 1939, *Fernald & Long*, no. 11,284; muddy tidal margin of Blackwater River, Milk Landing, south of South Quay, Nansemond County, September 22, 1939, *Fernald & Long*, no. 11,285; muddy tidal margin of Blackwater River, Cox Landing, south of South Quay, Nansemond County, September 22, 1939, *Fernald & Long*, no. 11,286. See pp. 396 and 399.

Forma *flaccida,* in its very thin, often translucent, and mostly broad leaves is readily confused with *X. difformis* Chapm. It has, however, the small heads and flowers of *X. caroliniana* and the relatively few nerves in the leaves. *X. difformis* is usually coarser, with the very thin and translucent leaves (emersed) 6–14 mm. broad and 20–40-nerved, often falcate, half as long as to longer than the scapes, the latter when fresh conspicuously winged; the mature heads are 1–2 cm. long, and the seeds about 25-ribbed. It is locally abundant in the extreme South, coming north to eastern Maryland, with a station near Laurel, Delaware (sandy swamps, Pepper's Mill, *A. Commons* in Herb. Phil. Acad.).

Typical *X. caroliniana,* occurring from Florida to Louisiana,

north to Nova Scotia, southeastern and central Maine, north-central New Hampshire, southeastern Vermont, eastern New York, thence west to Parry Sound, Ontario, Michigan and northern Indiana, is smaller, its opaque or subopaque leaves 0.5–6 mm. wide, mostly ⅓–½ as long as the mature scapes, and only 3–18-nerved (nerves vaguely seen by transmitted light). The scapes are less winged than in *X. difformis,* the mature spike 0.5–1.4 cm. long, the seeds about 13-ribbed.

In its thinner and mostly broader (5–8 mm. wide) elongate leaves (½ as long to nearly as long as scapes) *X. caroliniana* forma *flaccida* might be mistaken for *X. difformis,* especially when the leaves are translucent or not too encrusted with silt, but they have only 11–19 (rarely –23) nerves as in *X. caroliniana,* mature heads only 0.8–1.3 cm. long, and the seeds of *X. caroliniana.*

X. flexuosa Muhl. (*X. arenicola* Small). Local range extended into Nansemond County: wet sandy and peaty depressions in pineland southwest of Marsh Hill School, south of South Quay, no. 10,992; very abundant in sandy and peaty pine barrens, east of Cox Landing, south of South Quay, no. 10,566, this area covering many square miles. Isle of Wight County: sandy and peaty pine barrens south of Lee's Mill, no. 12,283. See p. 379.

*Commelina diffusa Burm. f. (*C. nudiflora* of Am. auth., not L.). King William County: fresh tidal shore of Mattaponi River, northwest of King William Courthouse, no. 11,550. Charles City County: sandy tidal shore of James River at "Four Oaks", below Harrison Point, no. 11,298. Princess Anne County: low woods and clearings along Back Bay, Long Island, no. 10,995. Norfolk County: Dismal Swamp, Wallaceton, July 17, 1891, *A. B. Seymour,* no. 39. Southampton County: wooded alluvial bottomland of Meherrin River, near Haley's Bridge, no. 9290. Greensville County: weed in fencerow, Emporia, nos. 9291 and 10,996. See pp. 388 and 391.

In his enumeration of stations for *C. diffusa* (as *C. longicaulis*) Pennell, Bull. Torr. Bot. Cl. xliii. 100 (1916), cited no specimens from north of Georgia except on ballast at Philadelphia. Although sometimes a weed in southeastern Virginia, *C. diffusa* is a constituent element of the flora of bottomlands and in tidal marshes. It has this dual behavior in many regions. If an adventive, it has frequently sought out very natural habitats.

Its pantropical distribution indicates its plasticity at least in recent times.

The Varieties of Commelina erecta (Plates 629–631).—One of the most bafflingly intricate series in *Commelina* is the group of plants which broadly constitute *C. erecta* L. In southeastern Virginia we get four variations of it, which by the treatment in Small's *Flora of the Southeastern United States* could be sorted into seven so-called species. Varying from plants 1 dm. high, with linear leaves at most 3 mm. broad and with fruiting spathes barely 1 cm. long to colonies 1.2 m. high, with lance-ovate leaves 4 cm. broad and spathes 3.6 cm. long, ranging from southeastern New York to Nebraska, thence south to the West Indies, Gulf States and Mexico, sometimes in the driest of sands, again in rich alluvium, these plants have naturally offered a fertile field for the "splitter". But in his treatment of the group in 1916 Pennell[14] sounded the call for retreat from further specific segregation; for, although he then maintained three species in the series (*C. erecta* L., *C. angustifolia* Michx. and *C. crispa* Wooton), he hesitated about recognizing more than one, *C. erecta*, saying (p. 105): "*Commelina angustifolia* Michx. and *C. crispa* Wooton, until more fully compared living, are continued as of specific rank. Both are probably better considered as geographic varieties of *C. erecta*." Pennell forthwith reduced to *C. erecta* the recently proposed *C. saxicola* Small, and to *C. angustifolia* both *C. Swingleana* Nash and *C. Nashii* Small. With these reductions I am heartily in accord. But, even the recognition of three varieties, typical *C. erecta* and vars. *angustifolia* (Michx.) and *crispa* (Wooton) Palmer & Steyermark, does not satisfactorily settle the problems in the species. In order to see how in the most conservative treatment we have, Pennell's, the three elements are defined we may quote his key:

Leaves lanceolate. Posterior petals usually larger, 12–25 mm. long. Seeds mostly more or less oblong .... 6. *C. erecta*
Leaves linear-lanceolate. Posterior petals usually smaller, 10–15(–20) mm. long. Seeds mostly circular ....
  Spathes 1.5–3 cm. long, with mostly long white hairs near the base. Posterior petals 12–18(–20) mm. long .... 7. *C. crispa*
  Spathes 1–2 cm. long, rarely with long white hairs near the base. Posterior petals mostly 10–15(–18) mm. long 8. *C. angustifolia*

[14] Pennell: *The Genus Commelina (Plumier) L. in the United States*, Bull. Torr. Bot. Cl. xliii. 96–111 (1916).

In 1938 Pennell wrote "I would now consider that this species includes as narrow-leaved subspecies the southern *C. angustifolia* Michx. and the southwestern *C. crispa* Wooton."[15] With this decision I entirely agree, except that the free intergradation of the three compel me to treat them as two geographic varieties and a minor form, rather than to dignify them as subspecies.

There is practically no doubt about the identity of *Commelina erecta* L., although there has long been needless confusion of it with *C. virginica* L. (the coarse species with extensively creeping rhizome and stolons, the sheath of the leaf with erect summit fringed with long erect reddish bristles, whereas *C. erecta* has a fascicle of fleshy root-fibers and the sheath has a spreading flange-like summit short-ciliate with white hairs). It was long cultivated in Europe as *C. erecta* and Linnaeus described it "foliis ovato-lanceolatis" (rendered by Pennell simply "lanceolate", and by Small, Fl. Se. U. S. 242, "linear to linear-lanceolate"). The plant of European gardens, "*Habitat in* Virginia", was well shown by Dillenius in *Hortus Elthamensis,* his plate cited by Linnaeus and, in view of the confusion evident in the Linnean Herbarium, selected by the late C. B. Clarke in DC. Mon. iii. 181, to stand for *C. erecta.* Dillenius showed broadly lanceolate leaves nearly 3 cm. broad, the spathes about 3 cm. long. Just such a plant, tall (up to 1.2 m. high), with broad leaves on the primary axis, and with large spathes, occurs in relatively rich soil from southeastern New York to Kansas, south to Florida, Louisiana and eastern Texas. Much of the material of this largest extreme of the species has the spathes (PL. 629, FIG. 1) subglabrous to only minutely hirtellous but, creating confusion, a considerable series (PL. 629, FIG. 3), differing in no other notable character, has the base of the spathe as shaggily villous with long white trichomes as in the western plants called var. *crispa* (low and with linear or linear-lanceolate leaves and small spathes). This large plant, with white-villous spathe-bases (PL. 629, FIGS. 2 and 3), is regularly dispersed through much of the range of typical *C. erecta* and, although it differs from it as var. *crispa* does from var. *angustifolia,* it can be called only a form, not a geographic variety.

The type of var. *angustifolia*, *C. angustifolia* Michx., as shown

[15] Pennell in Bartonia, no. 19: 21 (1938).

Photo. H. G. Fernald.

COMMELINA ERECTA: FIG. 1, mature spathe, × 2.
Forma INTERCURSA: FIG. 2, flowering tip, × 1; FIG. 3, spathe, × 2.
C. ERECTA, var. ANGUSTIFOLIA, forma CRISPA (*C. crispa*): FIG. 4, spathe, × 2, from western Texas; FIG. 5, spathes, × 2, from Virginia.
C. ERECTA, var. HAMIPILA: FIG. 6, spathe, × 1.

Photo. H. G. Fernald.

COMMELINA ERECTA, var. ANGUSTIFOLIA: FIGS. 1 and 2, portions of Michaux's TYPE of *C. angustifolia*, × 1; FIG. 3, spathes, × 2, from Georgia.

by a photograph of Michaux's plant (our PLATE 630, FIGS. 1 and 2) has merely narrowly lanceolate leaves (6–8 cm. long, 4–9 mm. broad) and spathes 1.6–2 cm. long. Just such a plant, low, with narrowly linear to narrowly lanceolate leaves mostly less than 1 dm. long and 0.4–2 cm. broad and mature spathes mostly 1–2 (rarely –2.5) cm. long, occurs in dry sands or rocky soils from Florida to Texas and northern Mexico, north to Delaware, West Virginia, southern Illinois, Missouri and Kansas. In this typical var. *angustifolia,* from which the types of *C. Swingleana* Nash ("leaves . . . 4–6 cm. long, 5–7 mm. wide . . .; spathe . . . 2 cm. long") and of *C. Nashii* Small ("leaf-blades 4–8 cm. long . . .; spathes 1 cm. long") are inseparable, the spathe (PL. 630, FIG. 3) is rather densely short-hirtellous; but the reputed var. *crispa* ("leaves . . . 3–7 cm. long, 4–6 mm. wide . . .; spathe . . . 1.5–2 cm. long, 1 cm. broad") seems to differ from it only in having the base of the spathe villous with long white trichomes. Var. *crispa* (PL. 629, FIG. 4) is supposed to occur from northern Mexico to Missouri and Nebraska and about the head of Lake Michigan. In the material from southern Michigan and northern Indiana I find no such long hairs, but specimens from Nebraska southward and southwestward often display them (PL. 629, FIG. 4). Except for this single character I find nothing by which var. *crispa* differs from var. *angustifolia.* The situation is nearly parallel with that in the broad-leaved typical *C. erecta;* in fact, it is quite parallel, for some of the low and narrow-leaved plants with relatively small spathes, in the sands of eastern Virginia, (PL. 629, FIG. 5) have the long trichomes which place them with *C. crispa,* supposedly restricted to the Southwest. I can, therefore, see in the latter only a barely recognizable form of var. *angustifolia.* The fact that, upon geographic grounds alone, highly competent students have been placing the plants of northern Mexico impartially in *C. crispa,* though most of them are typical var. *angustifolia,* is eloquent.

The plant of northern Indiana, often referred to *C. crispa,* lacks the long white pubescence of the spathes of true but relatively unimportant var. *crispa.* In the latter the longer leaves are mostly 4–10 cm. long, the mature spathes usually 1–2 (rarely –2.5) cm. long. The plant of northern Indiana and adjacent Michigan (PL. 631), thence locally to Texas, has the

longer (but narrow) leaves 7–15 cm. long, the mature spathes mostly 2.5–3 cm. long. It seems to be a well defined geographic variety, with which it is a pleasure to associate the name of its chief collector, the always alert Charles C. Deam.

In peninsular Florida, extending down to the Keys, there is another extreme (pl. 629, fig. 6), placed by Small and others in *C. angustifolia.* In the latter and in var. *Deamiana,* however, the mature spathes are more than half as high as long, with the lower margin straightish or only slightly curved, and the larger leaves are 4–20 mm. broad. The plant of the Florida Keys and southern and central Florida is very low and slender, the leaves only 3–5 mm. broad, the strongly falcate spathes long-beaked, 1.8–2.8 cm. long and less than half as high as long. It is a close match for the isotype in the Gray Herbarium of *C. hamipila* Wright, of Cuba. Clarke kept *C. hamipila* apart as a species, though stating that it was scarcely separate from *C. erecta.* The meagre material before him suggested that the spathes were solitary and axillary, never clustered. That they may be either solitary or grouped is now apparent from the several collections at hand. No difference in seed is evident and I am treating *C. hamipila* as a characteristic variety of southern Florida and Cuba.

As I see *Commelina erecta* it is a polymorphous species with pronounced but freely confluent varieties, as follows:

a. Stems (0.45–)0.6–1.2 m. high; larger leaves of primary axes lanceolate to lance-ovate, (0.9–)1–1.5 dm. long, (1.5–)2–4 cm. broad; mature spathes (2.2–)2.5–3.6 cm. long . . . . Var. *typica.*

a. Stems 1–4.5(–7) dm. high; larger leaves of primary axes narrowly linear to linear-lanceolate, 3–12(–20) mm. broad; mature spathes 1–2.7(–3) cm. long.

Mature spathe more than half as high as long, the lower margin only slightly curved; larger leaves 4–20 mm. broad.

Longer leaves 4–10 cm. long; mature spathes 1–2(–2.5) cm. long . . . . Var. *angustifolia.*

Longer leaves 7–15 cm. long; mature spathes mostly 2.5–3 cm. long . . . . Var. *Deamiana.*

Mature spathe less than half as high as long, strongly falcate to the prolonged beak, 1.8–2.8 cm. long; larger leaves 3–5 mm. broad . . . . Var. *hamipila.*

C. erecta L., var. **typica.** *C. erecta* L. Sp. Pl. 41 (1753), "*Habitat in* Virginia"; Clarke in DC. Mon. iii. 181 (1881); Pennell in Bull. Torr. Bot. Cl. xliii. 104 (1916).—Loamy or sandy soil, more rarely in rocky places, southeastern New York to Kansas, south to Florida, Louisiana and Texas. Plate 629, fig. 1.

Photo. H. G. Fernald.

Commelina erecta, var. Deamiana: figs. 1–3, portions of type, × 1; fig. 4, an inflorescence, × 1.

Photo. W. H. Hodge.

Lilium Catesbaei: fig. 5, base, and fig. 6, flower, × ½, from Duval County, Florida; fig. 7, capsule, × 1, from South Carolina; fig. 8, seeds, × 5, from South Carolina; fig. 9, seed, × 5, from South Carolina; fig. 10, seed, × 5, from Florida.

Var. Longii: fig. 1, plant folded (with bulb in lower left-hand corner), × ½, from type-series; figs. 2 and 3, capsules, × 1, from topotype; fig. 4, seeds, × 5, from same collection.

On the Coastal Plain of southeastern Virginia we have it only from SOUTHAMPTON COUNTY: dry woods, thickets and clearings along Three Creek, Drewryville, no. 5701.

*Forma **intercursa,** f. nov. (TAB. 629, FIG. 2 et 3), caulibus 0.45–1.2 m. altis; foliis majoribus primariis late lanceolatis 1–1.5 dm. longis 1.5–4 cm. latis; spathis maturis 2.3–3.6 cm. longis basi longe albido-villosis.—DELAWARE: Laurel, September 21, 1880, *A. Commons.* VIRGINIA: sandy thicket by James River, Jordan Point, Prince George County, July 23, 1938, *Fernald & Long,* nos. 8642, 8643 (TYPE in Herb. Gray, ISOTYPE in Herb. Phil. Acad.); sandy pine and oak woods south of Zuni, Isle of Wight County, July 20, 1938, *Fernald & Long,* no. 8644 (transition to var. *angustifolia*); dry sandy open pine and oak woods, 6 to 7 miles south of Franklin, Southampton County, June 19. 1938, *Fernald & Long,* no. 8183. SOUTH CAROLINA: Congaree River, June 19, 1855, *Hexamer & Maier;* Santee Canal, June, —, *H. W. Ravenel.* GEORGIA: dry rocky woods on southwest slope of Kennesaw Mountain, Cobb County, July 12, 1900, *Harper,* no. 219; northwest slope of Stone Mountain, DeKalb County, July 10, 1900, *Harper,* no. 11. TENNESSEE: cult. Harvard Bot. Gard. 1847, from French Broad River, *Gray.* MISSOURI: woods, Eagle Rock. August 12, 1905, *Bush,* no. 3222; dry soil. Prosperity, June 17, 1909, *Bush,* no. 2242.

Var. **angustifolia** (Michx.), comb. nov. *C. angustifolia* Michx. Fl. Bor.-Am. i. 24 (1803); Pennell in Bull. Torr. Bot. Cl. xliii. 108 (1916). *C. virginica, β angustifolia* (Michx.) C. B. Clarke in DC. Mon. iii. 183 (1881). *C. Swingleana* Nash in Bull. Torr. Bot. Cl. xxii. 160 (1895); Small, Fl. Se. U. S. 242 (1903). *C. Nashii* Small, l. c. (1903).—Dry sandy soil, Florida to New Mexico and Mexico, north to Delaware, West Virginia, southern Illinois, Missouri and Nebraska. PLATE 630.

*Var. ANGUSTIFOLIA is known in Virginia from the following stations. YORK COUNTY: sandy clearings near Capital Landing, Queen's Creek, *Grimes,* no. 4081. WARWICK COUNTY: Old Point Comfort, September 15, 1885, *N. L. Britton.* PRINCESS ANNE COUNTY: dry pine and oak woods, Cape Henry, *Fernald & Griscom,* no. 2805. ISLE OF WIGHT COUNTY: dry sandy pine barrens, south of Zuni, *Fernald, Griscom & Long,* no. 6565. SOUTHAMPTON COUNTY: dry sand, pine barren about 7 miles south of Franklin, no. 7373. NANSEMOND COUNTY: dry sandy woods along Pitch Kettle Creek, north of Lake Kilby, *Fernald, Long & Fogg,* no. 4840 (unusually tall, but with small spathes).

*Forma **albina,** f. nov., petalis albis.—Dry sandy barrens, Cape Henry, September 24, 1933, *Fernald & Griscom,* no. 2804 (TYPE in Herb. Gray).

Forma **crispa** (Wooton), comb. nov. *C. crispa* Wooton in Bull. Torr. Bot. Cl. xxv. 451 (1898); Pennell, ibid. xliii. 107 (1916). *C. erecta*, var. *crispa* (Wooton) Palmer & Steyermark in Ann. Mo. Bot. Gard. xxii. 417 (1935), without bibliographic reference, and in Rhodora, xl. 131 (1938), validation.—Through much of the range of the var. Plate 629, figs. 4 and 5.

*Forma crispa is known in Virginia at the following stations. Fauquier County: by railroad, Beverly Mill, *H. A. Allard*, no. 1013. New Kent County: dry sandy field by Chickahominy River, Lanexa, *Grimes*, no. 4172. Sussex County: dry sandy hickory and oak woods, Burt, no. 6133. Nansemond County: white sand of pine and oak woods and clearings near Cathole Landing, west of Factory Hill, no. 12,285.

Var. **Deamiana,** var. nov. (tab. 631), caulibus gracilibus 2–6 dm. altis; foliis lineari-lanceolatis vel linearibus majoribus 7–15 cm. longis 5–15(–20) mm. latis; spathis maturis plerumque 2.5–3 cm. longis.—Michigan: "State Collection". Indiana: sand hills on west or southwest side of Lake Maxinkuckee, Marshall County, August 19, 1915 and July 15, 1920, *Deam*, nos. 17,944 and 31,900; sand hill north of Ora, Starke County, July 14, 1920, *Deam*, no. 31,852; sandy cut along roadside 6 miles south of Vincennes, Knox County, July 8, 1915, *Deam*, no. 17,087; very sandy soil along railroad at Duncan Siding, about 4 miles southeast of Vincennes, August 18, 1931, *Deam*, no. 50,986; sand dunes, Dune Park, Porter County, July 30, 1897, *Umbach;* wooded sand hill, Dune Park, August 16, 1897, *Agnes Chase;* inner faces of frontal dunes, Mineral Spring, Porter County, August 13, 1920, *D. C. Peattie;* bog, Chesterton, Porter County, August 9, 1925, *J. R. Churchill;* very sandy roadside cut, 4½ miles north and 1½ miles west of Morocco, Newton County, August 30, 1916, *Deam*, no. 21,511; roadside sand-hill, 4½ miles northwest of Morocco, July 13, 1920, *Deam*, no. 31,662 (type in Herb. Gray). Illinois: Oquawka, July 7, 1908, *Gleason*. Kansas: shady places, Riley County, July 20, 1895, *J. B. Norton*, no. 524. Oklahoma: sandy hillside near Page, Leflore County, June 20, 1914, *O. W. Blakley*, no. 1456; Arbuckle Mountains, near Davis, June 25, 1917, *W. H. Emig*, no. 736. Texas: 3½ miles north of Jasper, Jasper County, May 18, 1937, *Cory*, no. 22,629.

Var. **hamipila** (Wright), comb. nov. *C. hamipila* Wright in Sauvalle, Fl. Cubana, 157 (1873).—Stems 1–4.5 dm. high; leaves linear, the larger 6–10 cm. long and 3–5 mm. broad; spathes 1.8–2.8 cm. long, less than half as high, strongly falcate, with prolonged beak.—Cuba and Florida. The following are from Florida: cleared hammock, New Smyrna, Volusia County, April

19, 1910, *S. C. Hood;* high pineland, vicinity of Eustis, Lake County, *Nash,* no. 387; dry sandy soil, open woodland, Kelsey City, Palm Beach County, *F. R. Randolph,* no. 105; riverside, East Fort Myers, Lee County, *A. A. Eaton,* no. 1416; pineland, vicinity of Fort Myers, *J. P. Standley,* no. 137; pineland, Mullock Creek District, southeast of Fort Myers, *J. P. Standley,* no. 430; Pine Key, *Blodgett:* Key West, *Blodgett.* PLATE 629, FIG. 6.

In PLATE 629, FIG. 1 shows a mature spathe (essentially glabrous), × 2, of *Commelina erecta* from Safe Harbor, Pennsylvania, *Heller & Heller,* no. 686; FIG. 2, a flowering tip, × 1 of forma *intercursa* from the type-station; FIG. 3, a spathe, × 2, from the TYPE of forma *intercursa,* showing the characteristic long hairs; FIG. 4, a mature spathe, × 2, of *C. erecta,* var. *angustifolia,* forma *crispa* (*C. crispa*) from western Texas, *Chas. Wright,* no. 700, in part; FIG. 5, spathes, × 2, of forma *crispa* from Burt, Sussex County, Virginia, *Fernald & Long,* no. 6133; FIG. 6, spathe, × 1, of var. *hamipila* from Florida, *J. G. Cooper.*

PLATE 630, FIGS. 1 and 2, portions of type, × 1, of *C. angustifolia* Michx., FIG. 3, spathes, × 2, of *C. erecta,* var. *angustifolia* from Stone Mountain, Georgia, *Wiegand & Manning,* no. 711.

PLATE 631, *C. erecta* var. *Deamiana:* FIGS. 1, 2 and 3, portions of TYPE, × 1; FIG. 4, inflorescence, × 1, from Mineral Springs, Porter County, Indiana, *D. C. Peattie.*

*ANEILEMA KEISAK Hassk. Thoroughly typical of fresh tidal marshes and shores from King and Queen to Nansemond County, and, doubtless, into North Carolina, flowering from September to frost. The following are the actual specimens collected. KING AND QUEEN COUNTY: Mattaponi River, Walkerton, no. 11,549. KING WILLIAM COUNTY: Mattaponi River, northwest of King William Courthouse, no. 11,548, and at Horse Landing, near King William Courthouse, no. 11,547. NEW KENT COUNTY: Pamunkey River, southeast of White House, no. 11,546; Chickahominy River at "Shady Rest", southeast of Windsor Shades (Boulevard Postoffice), nos. 11,290, 11,542; Chickahominy River, Lanexa, no. 11,543. CHARLES CITY COUNTY: James River at "Four Oaks", below Harrison Point, no. 11,282; Kimage's Creek, Kimage's, no. 11,291; Kittewan Creek, Weyanoke, nos. 11,292, 11,545; James River, Wilcox Wharf, no. 10,994; Morris Creek below Adams Bridge, no. 11,544. JAMES CITY COUNTY: Gordon Creek, east of Barrat's Bridge (or Ferry), no. 11,293. NANSEMOND COUNTY: Blackwater River at Milk Landing (no. 11,294) and at Cox Landing (no. 11,295), south of South Quay. See pp. 386, 391–394, 399 and 400 and MAP 20.

A characteristic plant, here recorded for the first time outside eastern Asia. It is a regular constituent of the estuarine flora, along with *Cyperus haspan* L., var. *americanus, Eryngium aquaticum, Rhynchospora macrostachya,* var. *colpophila* (see above) and the several other species which inhabit these peculiar

habitats. I have studied the material most carefully with Dr. Hiroshi Hara, who has been able to supply finely fruiting Asiatic specimens. In all characters, including the seeds, our plant seems quite inseparable from that of eastern Asia.

Tradescantia rosea Vent., var. graminea (Small) Anders. & Woodson. Local range extended eastward to Nansemond County: white sands of pine barrens south of South Quay (several nos.). See p. 379.

Juncus caesariensis Coville. Range in the state extended southward to Dinwiddie County: springy sphagnous swale about 5 miles east of Burgess Station, no. 11,000.

At our Henrico County station *J. caesariensis* was associated with an extraordinary series of species with disrupted ranges (see Rhodora, xli. 470, 473). So at the Dinwiddie County station it shares the honors with *Fuirena breviseta*, range extended north from North Carolina, *Scirpus debilis*, at our only station on the Virginian Coastal Plain, and other plants of great rarity in the region. See p. 389.

J. abortivus Chapm. To the single station recorded north of South Carolina (in Isle of Wight County) add from Nansemond County: very abundant in wet or moist sandy and peaty depressions of pinelands and pine barrens south of South Quay (many nos. from different stations). See p. 379.

J. megacephalus M. A. Curtis. To the previously recorded stations (False Cape and vicinity) add another, farther north in Princess Anne County: inner border of brackish to fresh marsh along Back Bay, at eastern margin of Long Island, no. 10,574. See pp. 370 and 371 and map 5.

J. diffusissimus Buckley. To the two stations previously recorded add the following, in Southampton County: wet clearing slightly west of Branchville, no. 10,190; along woodroad in wooded bottomland, Meherrin River, southeast of Branchville, no. 10,192; wet sandy roadside ditch south of Shiloh, no. 10,191; sandy roadside ditch southeast of Windman's Mill, no. 12,038. Greensville County: argillaceous clearing in swampy woods near Readjuster Bridge over Nottoway River, northeast of Orion, no. 12,039.

Tofieldia racemosa (Walt.) BSP. Local range extended eastward to Nansemond County: sphagnous savannah-like swale east of Cherry Grove, south of South Quay, no. 10,577. See p. 381.

Zigadenus glaberrimus Michx. Local range extended eastward to Nansemond County: wet peaty pine barrens, east of

Cox Landing, south of South Quay, no. 10,579. Isle of Wight County: sandy and peaty pine barrens, south of Lee's Mill, no. 12,294. See pp. 374 and 381.

Melanthium virginicum L. Local range extended eastward to Nansemond County: wet bushy swale east of Cherry Grove, south of South Quay, no. 11,003. See p. 381.

*Lilium Catesbaei Walt., var. **Longii,** var. nov. (tab. 632, fig. 1–4), a var. typico recedit bulbi squamis ovoideis efoliosis; foliis oblongis, imis mediisque obtusis 6–13 mm. latis; tepalis laxe adscendentibus apice vix recurvatis ad 3.5 cm. latis; capsulis subtruncatis 2.5–4.5 cm. longis; seminibus 5–6 mm. longis ala 1.4–1.6 mm. lata.—Local, from southeastern Virginia to Georgia and Alabama. The following are placed here. Virginia: sphagnous savannah-like swale east of Cherry Grove, south of South Quay, Nansemond County, July 21, 1939, *Fernald & Long,* no. 10,582 (type in Herb. Gray, isotype in Herb. Phil. Acad.), October 15, 1939, *Fernald & Long,* no. 11,553. North Carolina: pineland at Delway, Sampson County, August 25, 1938, *R. K. Godfrey,* no. 6176; pineland, White Lake, Bladen County, August 14, 1938, *Godfrey,* no. 5988; peaty grass-sedge savannah at Carolina Beach, New Hanover County, August 7, 1938, *Godfrey,* no. 5903. Georgia: Columbus, *Boykin.* Alabama: low, grassy pine barrens near Bolling, Butler County, August 28, 1885, *J. Donnell Smith.* See pp. 381 and 403.

Typical *Lilium Catesbaei* (our plate 632, figs. 5–10) has the slender bulb-scales often, or usually, terminated by long erect linear leaf-blades; its cauline leaves are acutish to long-attenuate, the broader ones (in a large series of specimens) 2–12 mm. broad. Its tepals have typically long slender claws and prolonged recurving tips, the claw being usually 0.25–0.36 as long as the blade, measurements of flowers of 32 collections showing the claw averaging 0.26 as long as the limb or, in other words, the limb about three times the length of the claw. Measurements of the limb of the broadest tepal show a range from 4.5–9.5 cm. long, with an average length (from 60 specimens) of 7 cm., the breadth ranging from 1–2.6 cm. (average 1.8 cm.). The capsule narrows gradually to a beak and the seeds are 4–5 mm. long, with wing (at broadest point) 0.6–1.2 mm. wide.

Var. *Longii* (plate 632, figs. 1–4) on the other hand, has the plumper bulb-scales without the leafy tips; the middle and lower cauline leaves are blunt and oblong, 6–13 mm. broad; the tepals are loosely ascending, without prolonged and recurving tips, consequently the proportion of claw and blade is very differ-

ent, measurements of all the collections at hand showing the claw to be 0.3–0.42 (average 0.37) as long as the blade, in other words the blade about twice the length of the claw. In actual size the largest blades show a range from 4.5–6.5 (av. 5.5) cm. long, and 1.8–3.4 (av. 2.6) cm. broad. The capsule is subtruncate at summit, not narrowed to a beak, and the seeds are larger, 5–6 mm. long, with wing 1.4–1.6 mm. wide.

In their extremes the two plants are quite unlike. Unfortunately, however, transitions occur and several collections are as near one as the other. I am, therefore, constrained to treat the blunt-leaved plant with broad tepals scarcely recurving as a marked variety. It is noteworthy that at the northern limit of the variety it was in full flower on July 21. At its next known area to the south it is in full flower from August 7–14 (the collection of August 25 showing the flowers fading), while the Alabama material was collected in prime flower on August 28.

Lilium Catesbaei, according to English writers and also growers of lilies about Boston, is almost impossible to cultivate, in part because it stands no freezing. Now that we have a variety of it, sturdier and perhaps handsomer than typical *L. Catesbaei*, with a natural northern station in Virginia, where ice frequently forms and the children look forward to out-door skating, there is hope that var. *Longii* may prove to be a successful plant in northern gardens. Fully ripe seed collected in October has been supplied to the Harvard Botanic Garden and to several private growers of lilies.

In this study I have had the great advantage of having before me the material from the herbarium of the New York Botanical Garden. With its special concentration upon the Southeastern States, it was expected that this collection would add materially to the known stations of var. *Longii*. Very strikingly, however, it contains only typical or nearly typical *L. Catesbaei*.

In PLATE 632, FIG. 1 is one of the TYPE specimens, × ½, of var. *Longii* from Nansemond County, Virginia; FIGS. 2 and 3, capsules, × 1, from the same station, *Fernald & Long*, no. 11,553; FIG. 4, seeds, × 5, from no. 11,553. The figures of typical *L. Catesbaei* are from the following specimens: FIGS. 5 and 6, base and flower, × ½, from Baldwin, Duval County, Florida, *Nash*, no. 2321; FIG. 7, capsule, × 1, from Bluffton, South Carolina, 1871, *Mellichamp;* FIG. 8, seeds, × 5, from Eutawville, South Carolina, *Eggleston*, no. 5018 (N. Y. Bot. Gard.); FIG. 9, seed, × 5, from Bluffton, South Carolina, *Mellichamp;* FIG. 10, seed, × 5, from Florida, *Chapman* (N. Y. Bot. Gard.).

ALETRIS AUREA Walt. Local range extended eastward to NANSEMOND COUNTY: sandy and sphagnous margins of thickets in pineland southwest of Marsh Hill School, south of South Quay, no. 11,006.

*TRILLIUM LANCEOLATUM Boykin. ?NORFOLK COUNTY: Great Dismal Swamp, west of Wallaceton, April 24, 1926, *Paul A. Warren*, no. 413.

Specimen (unidentified) received in exchange from the College of William and Mary. Professor Warren tells me that it could have come only from west of Wallaceton, but whether in Norfolk or southeastern Nansemond County he does not know. First record from north of Georgia. See p. 375 and MAP 11.

SMILAX PULVERULENTA Michx. To the very few recorded stations add the following. SUSSEX COUNTY: rich woods and bushy clearing just east of the "fall-line" along Nottoway River, Double Bridge, about 6 miles northwest of Jarratt, no. 11,302. SOUTHAMPTON COUNTY: rich sandy and loamy woods along Three Creek, northwest of Carey Bridge, no. 10,210.

*HYPOXIS HIRSUTA (L.) Coville, forma **villosissima,** forma nov., scapis pedicellis perianthiis fructibusque persistenter denseque albido-villosis, villis ad 3–4 mm. longis.—VIRGINIA: sandy thickets and clearings near Coppahaunk Swamp, south of Waverly, very scarce, June 19, 1939, *Fernald & Long*, no. 10,214 (TYPE in Herb. Gray). NORTH CAROLINA: open woods, Winston-Salem, June 30, 1921, *P. O. Schallert*.

Typical *Hypoxis hirsuta*, with a very inappropriate name, has the scapes and pedicels sparsely pilose, the expanding perianth loosely short-pilose but soon glabrate and the fruit sparsely pilose. Forma *villosissima* is conspicuous on account of the permanent and very dense long white villosity of scape, pedicels, perianth and fruit. At the type-station it is very scarce but there associated with *Seymeria cassioides* and other species of dry pinelands.

H. LEPTOCARPA Engelm. & Gray. Range extended northward to NEW KENT COUNTY: bottomland woods by Chickahominy River north of Long Bridge, southeast of Quinton, no. 11,304.

A considerable northward extension, from Greensville, Southampton and Nansemond Counties. See p. 397.

SISYRINCHIUM MUCRONATUM Michx. Local range extended southward into GREENSVILLE COUNTY: rich woods near Three Creek, north of Emporia, no. 10,217.

*×Gladiolus gandavensis Van Houtte. Dinwiddie County: old field, south of Petersburg, no. 10,593. Seen persisting in other old fields.

Canna flaccida Salisb. Prince George County: roadside fill bordering wooded swamp, northwest of Disputanta, no. 10,008.

Burmannia biflora L. Local range extended eastward into Nansemond County: sphagnous savannah-like swale east of Cherry Grove, south of South Quay, no. 11,009. See p. 384.

*×Habenaria Canbyi Ames. A single plant flowering with abundant *H. blephariglottis* and *H. cristata*, sphagnous savannah-like swale east of Cherry Grove, south of South Quay, no. 10,601. See p. 381.

Cleistes divaricata (L.) Ames. Nansemond County: scattered and scarce at two stations south of South Quay, nos. 11,010 and 11,011. See pp. 380 and 384.

*Calopogon pallidus Chapm. Nansemond County: sandy and peaty pine barrens east of Cox Landing, south of South Quay, no. 10,603; moist peaty depressions in white sand of pine barrens 1–1½ miles south of Cherry Grove, south of South Quay, no. 12,054. See p. 380 and map 13.

Extension north from North Carolina. Identified by Dr. D. S. Correll.

Spiranthes cernua (L.) L. C. Richard, var. odorata (Nutt.) Correll in Bot. Mus. Lfts. Harvard Univ. viii. 79 (1940). (*S. odorata* (Nutt.) Lindl.). King William County: fresh tidal shore of Mattaponi River, at Horse Landing, near King William Courthouse, no. 11,557 (some root-tips budding into new rosettes). Charles City County: fresh tidal marsh along Kittewan Creek, Weyanoke, no. 11,307 (plants up to 7.5 dm. high, completely submerged at high tide). Greensville County: wooded bottomland of Fontaine Creek, southeast of Taylor's Millpond, nos. 10,224 and 11,308 (completely drowned during much of the summer). See pp. 359, 394 and 401.

Ponthieva racemosa (Walt.) Mohr. Local range extended into Southampton County: rich marly woods along Three Creek, northwest of Cary Bridge, no. 11,487. See p. 363.

Hexalectris aphylla (Nutt.) Raf. Local new stations of very limited extent in Dinwiddie County, no. 10,605, and in Southampton County, no. 10,606.

*Carya ovata K. Koch, var. pubescens Sargent. Sussex County: rich deciduous woods along Nottaway River, southwest of Homeville, no. 10,226.

Described by Sargent from South Carolina and Tennessee southward. See p. 361.

*Castanea pumila (L.) Mill., var. Margaretta Ashe. Nansemond County: Dry white sand of pine barrens east of Sandy

Landing, south of South Quay, no. 11,313; similar habitat, southwest of Marsh Hill School, south of South Quay, no. 11,014. SOUTHAMPTON COUNTY: white sand of pine and oak woods north of Point Beach, south of Franklin, no. 11,315.

First records from northeast of western Alabama. Our specimens, having a well developed pale tomentum on the lower leaf-surfaces, belong to the form later called *C. Margaretta* var. *arcuata* Ashe (from Texas). See p. 398.

*CASTANEA PUMILA (L.) Mill., var. ASHEI Sudworth. NANSEMOND COUNTY: sandy and peaty pine barrens east of Cox Landing, south of South Quay, no. 11,310. SOUTHAMPTON COUNTY: sandy woods, southeast of Round Gut, southwest of Franklin, no. 11,309.

Extension north from eastern North Carolina. See p. 398.

QUERCUS PALUSTRIS Muench. SUSSEX COUNTY: by woodland brook northeast of Stony Creek, no. 10,617; border of wooded swamp north of Stony Creek, no. 10,618; wooded bottomland, Three Creek, southwest of Grizzard, no. 10,237.

Although Sargent (Man.) cites the Pin Oak as occurring in Virginia south of the Potomac only in the extreme west (Wythe County), it is characteristic of river-swamps over a considerable area of southern Sussex County. It was reported in Claytonia, i. 44 (1934) from Amelia and Charles City Counties as well as from counties farther in the interior. See p. 361.

Q. LAEVIS Walt. (*Q. Catesbaei* Michx.). NANSEMOND COUNTY: very abundant in the sandy area south of South Quay, many nos. See pp. 362 and 365.

*×Q. BUSHII Sargent (*Q. marilandica* × *velutina*). GREENSVILLE COUNTY: large tree on wooded bottomland by Nottoway River, northeast of Purdy, no. 11,015.

Sargent (Man.) cites × *Q. Bushii* only from Georgia, Florida, Alabama, Mississippi and Oklahoma. The tree near Purdy fruits heavily. See p. 383.

*×Q. SUBINTEGRA Trel. (*Q. cinerea* × *falcata*). NANSEMOND COUNTY: a single large shrub, sandy and peaty barrens, east of Cox Landing, south of South Quay, no. 11,322. SUSSEX COUNTY: dry sandy woods by Nottoway River, below Peters Bridge, southeast of Lumberton, no. 12,320, several individuals. See p. 403.

*HUMULUS SCANDENS (Lour.) Merrill (*H. japonicus* Sieb. & Zucc.). DINWIDDDIE COUNTY: becoming abundant by roadsides and in waste places, Petersburg, no. 11,018. See p. 390.

*Rumex Acetosella L., var. integrifolia Wallr. Surry County: roadsides and waste places, Surry Courthouse, no. 10,626. See p. 377.

Very striking, with most of its rosette-leaves slenderly tapering to base and exauriculate. Infrequent in North America.

*Polygonum hydropiperoides Michx., var. **breviciliatum,** var. nov., planta subrobusta; foliis primariis lanceolatis acuminatis subtus scabris 9–13 cm. longis 1.5–3.2 cm. latis; ochreae ciliis perbrevibus 0.8–1.2 mm. longis; ochreolis eciliatis vel ciliis ad 0.4 mm. longis; floribus valde exsertis; achaenio trigono.—Dinwiddie County, Virginia: deep ditch in swale south of Burgess Station, July 16, 1938, *Fernald & Long*, no. 8698, August 15, 1938, no. 9044 (type in Herb. Gray; isotype in Herb. Phil. Acad.).

When he defined the eight geographic varieties of *Polygonum hydropiperoides* in Rhodora, xxviii. 22–28 (1926), Stanford said: "It is highly improbable that varieties recognized in this paper exhaust the list of admissable geographic varieties. Among possible fields for future geographic research, the southern seaboard states below Virginia and those of the lower Mississippi basin, which are not particularly well represented in the material at hand, suggest attractive possibilities." Var. *breviciliatum* is presumably in North Carolina, though as yet we have only the material from Dinwiddie County. It is at once separated from the other eastern American varieties as follows. From typical *P. hydropiperoides* by its coarser habit, broader leaves (1.5–3.2 cm. wide as against 1–1.5 cm.), cilia of the ochreae only 0.8–1.2 (as against 2–4) mm. long, and of the ochreolae wanting or barely 0.4 (as against 0.5–1) mm. long. Var. *psilostachyum* St. John, type from Sable Island, Nova Scotia, has glabrous leaves barely acuminate and only 4.8 cm. broad, eciliate and glabrous ochreae and ochreolae, the latter with broadly open summit; var. *macerum* Stanford, a very slender plant of Florida (only 5–6 dm. high) has leaves barely 6 cm. long and 1 cm. broad, cilia of the ochreae 2–4 mm. long, of the ochreolae 2 mm.; var. *sanibalense* Stanford, also from Florida, is stout, but with elliptic obtuse short leaves, long cilia of ochreae, and ochreolae broadly turbinate. Superficially var. *breviciliatum* closely resembles var. *Bushianum* Stanford of Oklahoma, and var. *asperifolium* Stanford of California. Both

those varieties, however, have the ochreae and ochreolae long-ciliate, the cilia of the ochreae in var. *Bushianum* about 1 cm. long, in var. *asperifolium* 5–6 mm. long. Var. *breviciliatum* can scarcely be forced into any of these recognized varieties.

*Polygonella articulata (L.) Meisn. Nansemond County: dry white sand of pine barrens east and southeast of Cox Landing and east of Sandy Landing, south of South Quay, nos. 10,632, 11,025, 11,562 and 11,563. Isle of Wight County: dry sandy pine barrens and open woods, south of Lee's Mill, no. 12,068.[16] See pp. 379 and 403 and map 23.

A very extensive area, the plants, flowering in mid-October, often reaching a height of 8 dm. Although given a range south to Georgia ("or Fla.") by Small, *Polygonella articulata* is represented in the herbaria of the Academy of Natural Sciences of Philadelphia and the New York Botanical Garden and in the Gray Herbarium by no previous collections from south of northern Worcester County, Maryland, except for an old specimen bearing in Nuttall's hand the indefinite data: "Georgia. Dr. B[aldwin]". Whether it was actually collected in Georgia or whether there was confusion of data is an open question. Baldwin was born in Chester County, Pennsylvania; studied at the University of Pennsylvania; practiced medicine at Wilmington, Delaware, where he married; and, after moving to Georgia, made visits at Wilmington. The specimen which Nuttall had might have been picked in the North, the label being Nuttall's, not Baldwin's. In a letter dated "*Jefferson, November* 27, 1816", Baldwin wrote a friend:

> The distance from our lodgings on the Sand Hills to Fort Barrington, where we crossed the Altamaha, is about seven miles; and from thence to this place, forty one. I have frequently mentioned *Fort Barrington;* but it would puzzle a stranger to find any *Fort*, here. The remains are alone visible, in the midst of a luxuriant vegetation, a short way below the Ferry.
>
> Among the more rare productions of the Sand Hills, we find the *Eriogonum tomentosum*, *Polygonum articulatum*, and *Stipulicida setacea*, of Michaux;—all of which are found on the middle districts of Georgia, and not on the sea-coast. . . . I suspect, with Pursh, that the *Polygonum articulatum*, and *polygamum*, are merely *varieties*. The one found here, however, has always *flores albi*,—and is frequently more than two feet in height. That the northern plant should be *annual*, and the southern one *perennial*, is by no means extraordinary.[17]

[16] Also in white sand of pine barrens, Wyanoke, Gates County, North Carolina, no. 11,564.

[17] William Baldwin as quoted by Darlington, Reliquiae Baldwinianae, 334 (1843).

The last sentence quoted clearly shows that Baldwin knew as *Polygonum articulatum* (=*Polygonella*) in the Sand Hills of Georgia a white-flowered perennial, not the usually pink-flowered annual, but that he knew the northern plant as an annual (apparently *not* white-flowered). The Georgian source of the Nuttall specimen is not verified by its reputed collector.

*Amaranthus Torreyi (Gray) Benth. Dinwiddie County: roadsides and waste places, Petersburg, no. 10,633.

Native from Iowa to Texas and westward. A colony of vigorous plants, likely to spread. See p. 369.

Iresine rhizomatosa Standley. Range extended farther north in Princess Anne County: low woods and clearings along Back Bay, Long Island, nos. 10,636, 10,637 and 11,028. See pp. 370 and 371.

For discussion see Rhodora, xxxviii. 379 and 416 (1936); and xxxix. 483, map 58 (1937).

*Froelichia gracilis (Hook.) Moq. Dinwiddie County: cinders of freight-yard of Norfolk & Western Railroad, Petersburg, no. 10,639. Sussex County: similar habitat about 2 miles west of Waverly, no. 10,638. Henrico County: waste places and railroad ballast, Richmond, no. 12,338.

A western species (Iowa to Arkansas and southwestward), likely to become more established. See p. 374.

*Paronychia fastigiata (Raf.) Fern., var. paleacea Fern. in Rhodora, xxxviii. 421, pl. 447, figs. 6 and 7 (1936). Sussex County: border of rich deciduous woods along Nottoway River, southwest of Homeville, no. 10,251; white sand of dry woods near Nottoway River, south of Chub, no. 12,340; exsiccated brookbed in alluvial woods, Nottoway River, southeast of Owen's Store, no. 12,341; moist sandy roadside ditch, near Nottoway River, at Green Church Bridge, northwest of Owen's Store, no. 12,342.

First from south of Delaware and Pennsylvania. See p. 361.

*P. riparia Chapm. Dry sands and sandy woods of Isle of Wight, Sussex and Southampton Counties (many numbers).

This is the plant erroneously reported in 1937 as *P. Baldwinii.* I am indebted to Dr. Core for clarifying the identification.

Sesuvium maritimum (Walt.) BSP. To the station (Dam Neck) formerly reported add the following, also in Princess Anne County: open muddy and sandy shores of Back Bay, east of Munden, no. 11,029; east of Creeds, nos. 11,030 and 11,031. See pp. 369 and 387.

*STELLARIA MEDIA (L.) Cyrill., var. GLABERRIMA G. Beck. Lawns of GREENSVILLE and SOUTHAMPTON COUNTIES.

This is the pernicious weed most erroneously reported in RHODORA, xli. 489 and 540 (1939) as the native southern *Stellaria prostrata* Baldwin. The latter is still unknown in Virginia. My apology for the erroneous identification is the lame one, that I accepted the verdict of a student who was making an intensive study of the genus. As I have elsewhere pointed out, the motto of the true scientist unfortunately has to be: "you can trust no one." We sometimes weaken and do so!

SILENE NOCTIFLORA L. PRINCE GEORGE COUNTY: cinders of freight-yard, Norfolk & Western Railroad, east of Petersburg, no. 11,335.

NUPHAR FLUVIATILE (Harper) Standley. Range in the state extended eastward to NANSEMOND COUNTY: muddy margin of Blackwater River, Milk Landing, south of South Quay, no. 10,643; seen, forming a definite band of vegetation near the eastern margin of the river, northward to the draw-bridge at South Quay.

RANUNCULUS FLABELLARIS Raf., forma RIPARIUS Fernald in RHODORA, xxxviii. 171 (1936). NEW KENT COUNTY: bottomland woods by Chickahominy River north of Long Bridge, southeast of Quinton, no. 11,336. SUSSEX COUNTY: gum and cypress swamp bordering pond, east of Littleton, no. 12,348. SOUTHAMPTON COUNTY: dried-out pools, wooded bottomland, Meherrin River, southeast of Branchville, no. 10,259.

Certainly local in southeastern Virginia.

OUR VARIETIES OF RANUNCULUS BULBOSUS. In the Northeastern States *Ranunculus bulbosus* L. is a tolerably uniform plant, with the three leaflets of the radical leaves cleft into 2 or 3 divisions, these again with short segments, the petioles and stems silky-villous to glabrate. In southeastern Virginia, however, the species there abundantly naturalized, is much more variable, three fairly definite varieties being recognizable in the field. These were worked out with me several years ago by Mr. Ludlow Griscom but our notes never published. They are here included. Besides the typical form, *R. bulbosus,* var. *typicus* Erdner, we there find var. VALDEPUBENS (Jordan) Briq., Fl. Corse, i. 619 (1910), with foliage as in var. *typicus,* but the whole plant strongly spreading-villous, often giving a hoary effect; and var. DISSECTUS Babey, Fl. Jurassienne, i. 39 (1845), with the leaves finely dissected into elongate linear segments.

*Var. VALDEPUBENS in the United States is chiefly in the Southeast and only occasional northward into New York and Rhode Island. We have examined the following specimens. RHODE ISLAND: Cumberland, May 30, 1911, *C. H. Knowlton.* NEW YORK: bank of Mohawk River, east of Crescent, Saratoga Co., May 30, 1906, *S. H. Burnham.* VIRGINIA: Buckroe, May 18, 1912, *Robinson*, no. 302; near Norfolk, April 23, 1911, *Tidestrom*, no. 4495: roadside east of Little Creek, Princess Anne Co., *Fernald & Griscom*, no. 4402; cinders of freight-yard of Atlantic Coast Line Railroad, Petersburg, no. 12,076.

*Var. DISSECTUS is more generally dispersed, but apparently local: MAINE: Somesville, Mt. Desert Isl., June 15, 1928, *G. L. Stebbins, Jr.* MASSACHUSETTS: near Spring Pond, Peabody, June 11, 1896, *J. H. Sears;* Beaver Hill, Middlesex Fells Reserv., June 9, 1920, *N. T. Kidder;* Blue Hills Reserv., June 10, 1920, *N. T. Kidder.* RHODE ISLAND: Nayatt, Barrington, May 30, 1911, *M. L. Fernald;* Middletown, May 31, 1908, *E. F. Williams.* NEW YORK: Inwood, New York City, May 14, 1887, *Mrs. L. M. Parker;* Ledyard, Cayuga Co., *Wiegand*, no. 6449. VIRGINIA: Campbell, Bedford Co., May 14, 1871, *A. H. Curtiss;* near Blackwater River, Princess Anne Co., *Fernald & Griscom*, no. 4401. MICHIGAN: Agricultural College, May 23, 1894, *C. F. Wheeler.*

SASSAFRAS ALBIDUM (Nutt.) Nees. GREENSVILLE, SOUTHAMPTON, SUSSEX and NANSEMOND Counties (many nos.).

The typical form of the species, with glabrous branchlets and leaves; often more abundant than the pubescent extreme.

*RORIPPA SESSILIFLORA (Nutt.) Hitch. HENRICO COUNTY: James River, Richmond, May 11, 1894, *J. R. Churchill.*

A characteristic species of the Mississippi Valley.

ARABIS CANADENSIS L. SUSSEX COUNTY: rich deciduous woods along Nottoway River, southwest of Homeville, no. 10,272.

Our first station on the Coastal Plain. See p. 361.

DROSERA ROTUNDIFOLIA L. NANSEMOND COUNTY: swampy depressions in pine barrens south of Cox Landing, south of South Quay, no. 10,663; sphagnous savannah-like swale east of Cherry Grove, south of South Quay, no. 10,662. Seen some years ago in ISLE OF WIGHT COUNTY: in sphagnum near Joyner's Bridge.

It is a striking fact that the only stations we know on the Coastal Plain (south of the James) for *Drosera rotundifolia* are near the eastern border of the Blackwater River.

D. INTERMEDIA Hayne. NANSEMOND COUNTY: sphagnous savannah-like swale east of Cherry Grove, south of South Quay, no. 10,664.

Very local in southeastern Virginia: frequent in Princess Anne County but rare on the Coastal Plain farther west.

*SEDUM ALBOROSEUM Baker. GREENSVILLE COUNTY: naturalized in roadside thicket near Dahlia, no. 9575.

*HAMAMELIS VIRGINIANA L., var. PARVIFOLIA Nutt. See Fernald in RHODORA, xxiii. 265 (1921). NANSEMOND COUNTY: depressions in the pine barrens south of South Quay, several stations, nos. 10,666, 10,667, 11,339 and 11,570. ISLE OF WIGHT COUNTY: peaty and sandy thicket in pine barrens south of Lee's Mill, nos. 12,358 and 12,359. SUFFOLK COUNTY: dry woods of a "hammock", Great Dismal Swamp, west of Yadkin, no. 11,041 (transitional). SOUTHAMPTON COUNTY: sandy woods southeast of Round Gut, southwest of Franklin, no. 11,340; swampy woods west of Wiggins School, south of Franklin, no. 11,341.

Much of the material has the lower surfaces of the leaves strongly whitened but I am unable to separate it on any character (including seeds) from the thick-leaved shrub of Nova Scotia and New England with densely pubescent lower leaf-surfaces. Torrey & Gray, taking up Nuttall's variety, cited it from the mountains of Pennsylvania and from Louisiana. There has been no material in the Gray Herbarium from south of Nova Scotia, Maine and Massachusetts, where the lower surfaces are often, but not always, rufescent; but Mr. Long sends me for study the Pennsylvania material at the Philadelphia Academy. This consists of Nuttall's type from "mts., Penn", and characteristic specimens from Pocono (*Wolle*) and from Sand Patch, alt. 2500 feet, "summit of Allegheny Mts.", Somerset County (*C. F. Saunders*). See p. 380.

GILLENIA TRIFOLIATA (L.) Moench. SUSSEX COUNTY: dry sandy hickory and oak woods, Burt, no. 11,042.

Our only Coastal Plain station.

*POTENTILLA INTERMEDIA L. SURRY COUNTY: roadsides and waste places, Surry Courthouse, no. 10,676. See p. 377.

*RUBUS GENICULATUS Kalt. PRINCESS ANNE COUNTY: extensively trailing, waste ground at old railroad terminal, Munden, no. 10,674. DINWIDDIE COUNTY: roadsides and waste places, Petersburg, no. 10,673.

One of the sprawling and climbing European species.

R. GRIMESII Bailey. Local range extended southward. SUSSEX COUNTY: rich deciduous woods along Nottoway River, southwest of Homeville, no. 10,287. GREENSVILLE COUNTY: open

thickets, clearings and borders of woods east of Emporia, no. 10,291.

*R. Janssonii Bailey. Sussex County: wet woods, Assamoosick Swamp, about 2 miles northeast of Homeville, no. 10,286.

I am unable to find any points to separate this from the trailer of southern New England. See p. 361.

*Rubus (Eubatus, § Tholiformes) **pernagaeus,** sp. nov. (tab. 633 et 634), arcuans, cannis simplicibus 6–7 dm. longis apice radicantibus; primocannis 2–3.5 mm. diametro subteretibus viridibus glabris sparse setosis setis aculiformibus, deinde uncinatis; primocannae foliis ternatis subquinatis, immaturis supra strigoso-pilosis subtus subvelutinis; foliolis terminalibus cuneato-obovatis 2.7–3.2 cm. longis argute duplicato-serratis sublobatis; floricannae foliis ternatis foliolis anguste cuneato-obovatis, ramorum sterilium foliolis 1.5–3.5 cm. longis; ramorum floriferum foliolis terminalibus vel foliis simplicibus 1.5–2.5 cm. longis; corymbis 1–3-floris; pedicellis laxe adscendentibus 1–2 cm. longis valde glandulosis plerumque bracteolatis; calycibus glandulosis lobis late ovatis 4 mm. longis deinde reflexis; petalis roseotinctis 6–8 mm. longis 4 mm. latis; fructibus ignotis.—Isle of Wight County, Virginia: roadside thicket near Smithfield, April 5, 1938, *Fernald & Long*, no. 7879, distributed erroneously as *R. pauxillus* Bailey.

Rubus pernagaeus (of the land of ham, Smithfield hams, from peanut-fattened hogs, having a reputation which has extended far from Virginia) was placed under *R. pauxillus* as a simple but quite unsatisfactory means of getting the specimens roughly identified. *R. pauxillus,* characterized by Bailey as "Littlest of the upright blackberries in the United States", is stiff and erect (instead of arching and tip-rooting) and belongs in § *Arguti* Rydb. It has the primocane-leaflets ovate (instead of narrowly cuneate-obovate); its floricane-leaflets, likewise, broadly ovate (instead of narrowly cuneate-obovate); "pedicels pubescent and sometimes with a few glandular hairs" (in *R. pernagaeus* copiously glandular); calyx apparently glandless, and petals much longer. *R. pernagaeus* in some ways resembles members of § *Procumbentes,* though the canes are more arching and less prostrate than in theoretically characteristic members of the *Procumbentes.* Its tiny corymb of 1–3 flowers is suggestive of that section, but I am unable to place it with any described member of that group. *R. Enslenii* Tratt. sometimes has glandular

Photo. H. G. Fernald.

RUBUS PERNAGAEUS: FIG. 1, floricane and tip of primocane, × 1; FIG. 2, bud and reflexed calyx-lobes, × 5.

Photo. H. G. Fernald.

Rubus pernagaeus: fig. 1, floricane, × 1; fig. 2, tip of primocane, × 1.

pedicels and calyx, but the very short pedicels and small pink flowers and the cuneate primocane-leaflets of *R. pernagaeus* keep it apart from *R. Enslenii.* *R. centralis* Bailey (type from southern Indiana) has glandular pedicels, but the plant is trailing, the primocanes branching, the terminal primocane-leaflets "broadly subcordate-ovate", the floricane-foliage similar, and the calyx-lobes ascend in fruit.

*SANGUISORBA MINOR Scop. DINWIDDIE COUNTY: dry field about 5 miles east of Burgess Station, no. 11,043. See p. 390.

*CASSIA FASCICULATA Michx., forma JENSENI Palmer & Steyermark. SUSSEX COUNTY: sandy pine and oak woods south of Stony Creek, no. 11,348.

An albino.

*CASSIA FASCICULATA Michx., var. **macrosperma,** var. nov. (TAB. 635, FIG. 1 et 2), planta 1–1.7 m. alta; caule ramisque piloso-hirsutis vel glabratis; pedicellis hirsutis; leguminibus plerumque 4–8.5 cm. longis 5–10 mm. latis strigosis vel glabratis, suturis hirsutis, segmentis 5.5–7 mm. latis; seminibus 4–10, oblique rhomboideo-ovatis valde rostratis plerumque 5.5–7.5 mm. longis 4–6 mm. latis.—Fresh tidal marshes and shores, southeastern VIRGINIA: sandy tidal shore of James River, at "Four Oaks", below Harrison Point, Charles City County, September 16, 1939, *Fernald & Long,* no. 11,349; fresh tidal marsh along Kittewan Creek, Weyanoke, Charles City County, September 18, 1939, *Fernald & Long,* no. 11,350 (TYPE in Gray Herb.; ISOTYPE in Herb. Phil. Acad.), October 14, 1939, no. 11,573 (fully ripe legumes); fresh tidal marsh of Chickahominy River, below Barrat's Bridge (or Ferry), James City County, September 19, 1939, no. 11,351 (flowering material); fresh tidal marsh of Pamunkey River, southeast of White House, New Kent County, October 14, 1939, no. 11,574 (fully ripe); fresh tidal shore of Mattaponi River at Horse Landing, near King William Courthouse, King William County, October 14, 1939, no. 11,575 (legumes rather small); fresh tidal shore of Mattaponi River, Walkerton, King and Queen County, October 16, 1939, no. 11,576 (ripe). See pp. 393, 394 and 400.

Cassia fasciculata, var. *macrosperma* is remarkable for its great stature and large legumes and seeds; it is also noteworthy for its apparent restriction to the tidal reaches of the rivers and creeks, partially or wholly submersed at high tide, partially emersed at low tide. It thus forms a characteristic element in the estuarine flora of the region.

Typical *C. fasciculata* (*C. Chamaecrista* of authors, not L.) is mostly much lower (1.5–9 dm. high), with minute appressed pubescence, the legumes (FIG. 3) 2.5–5 cm. long and 4–5.5 mm. broad, with segments 3–4.5 mm. broad, the 4–13 seeds (FIG. 4) 3.5–5 mm. long and 2.5–4 mm. broad. Var. *robusta* (Pollard) Macbride, chiefly of the Mississippi drainage, differs from typical *C. fasciculata* primarily in being more spreading-pubescent; its legumes (FIG. 5) and seeds are not conspicuously larger.

PLATE 635, FIG. 1, shows portions of the TYPE, × 1, of *Cassia fasciculata*, var. *macrosperma;* FIG. 2, seeds, × 3, from the TYPE. FIG. 3 is ripe fruits, × 1, of typical *C. fasciculata* from west of White Bluffs, Dickson County, Tennessee, *Svenson*, no. 4403; FIG. 4, seeds, × 3, of *C. fasciculata* from New Castle, Delaware, *Benner*, no. 8584; FIG. 5, fruits, × 1, of var. *robusta* from Auburn, Alabama, *Earle & Earle*, no. 30.

*TRIFOLIUM PRATENSE L., forma PILOSUM (Griseb.) Hayek. GREENSVILLE COUNTY: open thickets, clearings and borders of woods east of Emporia, no. 11,051.

An extremely long-pilose form.

*MEDICAGO LUPULINA L., var. GLANDULOSA Neilr. PRINCE GEORGE COUNTY: cinders of freight-yard, Norfolk & Western Railroad, east of Petersburg, no. 11,352.

*TEPHROSIA SPICATA (Walt.) T. & G., var. **semitonsa,** var. nov., caulibus sparse piloso-hirsutis; rhachibus subglabris, foliolis supra glabris vel glabratis; leguminibus sparse strigoso-pilosis. VIRGINIA: Southampton County: white sand of pine and oak woods at Round Gut, southwest of Franklin, September 20, 1939, *Fernald & Long*, no. 11,353, plants stiffly erect (TYPE in Herb. Gray; ISOTYPE in Herb. Phil. Acad.). Nansemond County: dry sandy woods and adjacent clearings, Kilby, September 11, 1935, *Fernald, Long & Fogg*, no. 4892; dry sandy woods, Factory Hill, August 26, 1936, *Fernald & Long*, no. 6612. Isle of Wight County: dry sandy yellow pine and oak woods near Walters, July 28, 1936, *Fernald & Long*, no. 6235; dry sandy pine woods south of Zuni, August 24, 1936, *Fernald & Long*, no. 6611; white sand of dry woods and clearings east of Joyner's Bridge, July 17, 1940, *Fernald & Long*, no. 12,379. See p. 398.

There are two strongly marked varieties of *Tephrosia spicata* in southeastern Virginia. Assuming that the identification by Torrey & Gray of Walter's *Galega spicata* was correct and that the subsequent identifications of Small, Rydberg and others (as *Tephrosia* or as *Cracca*) are correct, typical *T. spicata* is the densely villous extreme extending from Florida to Louisiana and north to Tennessee and Delaware. It is common in southeastern

Photo. W. H. Hodge.

CASSIA FASCICULATA: FIG. 3, fruits, × 1, from Tennessee; FIG. 4, seeds, × 3, from Delaware.
Var. MACROSPERMA: FIG. 1, portions of TYPE, × 1; FIG. 2, seeds, × 3, of TYPE.
Var. ROBUSTA: FIG. 5, fruits, × 1, from Alabama.

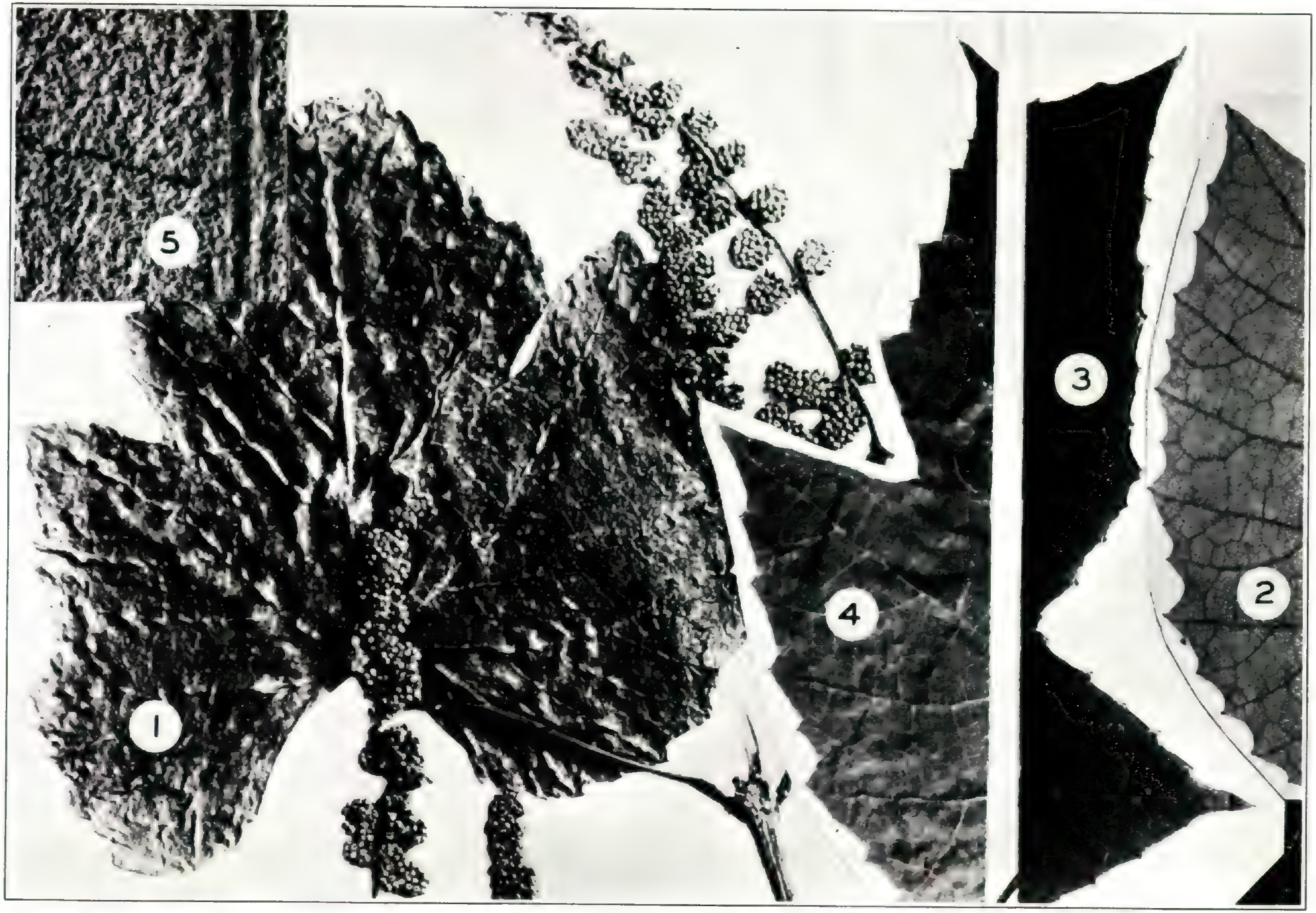

Photo. H. G. Fernald.

Vitis Labrusca: fig. 1, portion of type, × 1, in Linnean Herbarium; figs. 2–4, leaf-margin, × 1; fig. 5, pubescence of lower leaf-surface, × 10.

Virginia, extending northward at least to Princess Anne and York Counties. In view of the fact that many segregates have been made from the traditional *T. spicata,* it is highly important carefully to check the type of *Galega spicata* Walt. Fl. Carol. 188 (1788) which had the wholly inconclusive diagnosis "Spicis longis terminalibus." That simple character belongs to several southern species.

From its sparse pubescence extreme plants of *Tephrosia spicata,* var. *semitonsa* might be mistaken for *T. hispidula* (Michx). Pers., which is known from Virginia only through very old specimens without definite data. Although Small (Man.) separates *T. hispidula* (as *Cracca hispidula*) by "Pubescence of the stem of appressed hairs" and Rydberg (in N. Am. Fl.) says "stem . . . sparingly strigose or glabrate", the type of *Galega hispidula* Michx. (as shown by a photograph) has some spreading hairs; so has the specimen from Virginia (old specimen of Torrey & Gray; Michaux said "in Virginia, Carolina et Georgia") and some from South Carolina, Georgia and Florida. The clearest distinctions between *T. hispidula* and *T. spicata,* var. *semitonsa* are as follows:

T. hispidula. Stem, rachis and petiolules strigose-hispid; principal leaflets lanceolate, lance-oblong or oblanceolate, strigose-sericeous beneath; pedicels filiform; upper calyx-lobes deltoid-lanceolate, 1.5–3 mm. long.

T. spicata, var. semitonsa. Stem, rachis and petiolules spreading-pilose or -villous; principal leaflets oblong-obovate, appressed-pilose beneath; pedicels stout; upper calyx-lobes lance-subulate, 2.5–3.5 mm. long.

Aeschynomene virginica (L.) BSP. To the stations recorded in 1939 add others (often very extensive) on fresh tidal shores in King William, New Kent, Charles City and James City Counties (many nos.). See pp. 385, 391, 393, 394, 400 and 402.

*Desmodium glabellum (Michx.) DC. Nansemond County: white sand of pine and oak woods and clearings near Cathole Landing, west of Factory Hill, no. 11,356.

A close match for the type of Michaux from South Carolina, our material and a fragment and photograph of Michaux's type being the only representatives of the species I have seen. The more northern and larger-leaved plant passing as *Desmodium glabellum* is *D. humifusum* Beck. See p. 399.

*Lespedeza angustifolia (Pursh) Ell., forma **subvelutina,** f. nov., caulibus calycibusque densissime subvelutino-pilosis, pilis subpatentibus; foliolis subtus dense subadpresso-pilosis.—

With typical *L. angustifolia* or by itself, southern New Jersey to North Carolina. New Jersey: sand, Cold Spring, Cape May County, August 30, 1917, *Gershoy*, no. 386, distrib. as *L. angustifolia* × *capitata;* dry soil, Bennett, Cape May County, August 8, 1925, *H. E. Stone*, distrib. as *L. oblongifolia*. Virginia: sphagnous bog about 1 mile northwest of Dahlia, Greensville County, August 20, 1938, *Fernald & Long*, no. 9077 (type in Herb. Gray; isotype in Herb. Phil. Acad.), growing mixed with typical *L. angustifolia;* sphagnous swale at head of north fork of Mill Swamp, south of Emporia, August 18, 1939, *Fernald & Long*, no. 11,060. North Carolina: Bladensboro, September 3, 1908, *Eggleston*, no. 4043, in part (mixed with typical *L. angustifolia*).

*Strophostyles umbellata (Muhl.) Britton, forma **ochroleuca,** forma nov., floribus ochroleucis. Greensville County, Virginia: open thickets, clearings and borders of woods east of Emporia, August 18, 1939, *Fernald & Long*, no. 11,065 (type in Herb. Gray, isotype in Herb. Phil. Acad.)

*Geranium dissectum L. James City County: cultivated field, 1 mile south of Williamsburg, *Grimes*, no. 3469 (reported as *G. carolinianum*). Southampton County: roadside, Boykins, no. 10,310.

Decidedly unusual in the Atlantic States. The only other material from the East in the Gray Herbarium is from Athens, Georgia, but it is included in the *Flora of the District of Columbia* from College Park, Maryland. The species is widely dispersed on the Pacific slope from southern British Columbia to California.

*Polygala polygama Walt. Southampton County: dry sandy pine woods near Nottoway River, above Carey Bridge, no. 10,311; border of dry mixed woods by Applewhite's Church, no. 10,312; rich wooded slopes and clearings by Three Creek, north of Applewhite's Church, no. 12,122. See p. 362.

We have never before met *Polygala polygama* on the Coastal Plain of Virginia, nor is it represented in the Gray Herbarium from between Montgomery County, Maryland (Great Falls and vicinity) and South Carolina. Wheelock in his monograph (Mem. Tor. Bot. Cl. ii. 140) cited nothing from Virginia and North Carolina. Our material is the true southern *Polygala polygama* of Walter, with very loose racemes, the flowers 4–6 mm. apart, 5–6 mm. long, on pedicels 1.5–3.5 mm. long, with the obovate wings much exceeding the capsule. The plant of Great Falls belongs to the wider-ranging and mostly northern var.

obtusata Chodat, with closer-flowered raceme, the flowers 1–4 mm. apart, 3–5(–6) mm. long, on pedicels 0.5–2 mm. apart, the wings strongly rounded above and shorter than to exceeding the capsule. The latter extends northward to Nova Scotia, central Maine, central New Hampshire, Vermont, New York, southern Ontario, Michigan, Wisconsin and Minnesota. I have seen typical *P. polygama* only from Florida, Georgia, South Carolina and southeastern Virginia.

POLYGALA VERTICILLATA L. To the station in Greensville County, noted in 1938, add one in SOUTHAMPTON COUNTY: argillaceous clearing near Blackwater River, southeast of Ivor, no. 10,700.

In RHODORA, xl. 337, pl. 501 (1938), I held as true *Polygala verticillata* the plant which Linnaeus actually had in his own herbarium prior to 1753 and which closely matches his diagnosis and notes; but Pennell still urges[18] (if I understand his long argument) that the species could as well rest on earlier specimens and concepts not so clearly identifiable as familiar to Linnaeus. If our identifications of the vague and mostly too inclusive American species of Linnaeus are to be determined by psychoanalysis of what one supposes Linnaeus to have thought, or by the specimens less known to him and least matching his mature notes, rather than by the specimens actually before him in preparing *Species Plantarum* and which better match his original diagnoses and notes, we might as well give up. Different psychoanalysts and interpreters of the vague past rarely draw identical conclusions from identical data. Similarly, no two modern botanists are likely to agree as to just what passed in the brain of Linnaeus a couple of centuries ago. Interpretation of his species is difficult enough even when the inadequate specimens before him are studied. Whenever possible we should rest our conclusions on the clearest, rather than the vaguest evidence.

P. VERTICILLATA, var. ISOCYCLA Fern. To the few recorded stations add the following. SUSSEX COUNTY: rich woods and bushy clearing just east of the "fall-line" along Nottoway River, Double Bridge, about 6 miles northwest of Jarratt, no. 11,070; dry old field and border of woods, near Nottoway River, southeast of Stony Creek, no. 12,392. SOUTHAMPTON COUNTY: wooded bottomland, Meherrin River, southeast of Branchville, no. 10,313.

[18] Pennell in RHODORA, xli. 378–384 (1939).

P. VERTICILLATA, var. AMBIGUA (Nutt.) Wood. To the stations recorded in 1938 add the following. SUSSEX COUNTY: border of wooded swamp north of Stony Creek, no. 10,701.

In the article above cited I referred to *Polygala verticillata* as a polymorphous species. Experience with it in the field for more than 50 years makes this polymorphism quite evident to me; and Mr. Long's and my experiences in the field in eastern Virginia and elsewhere show that the separation of adjacent colonies into varieties (to say nothing of "species") is somewhat arbitrary. Plants referable to var. *ambigua* can often be separated from others called true *P. verticillata* only by a careful consideration of the degree to which intergradation can be discounted. It is, therefore, surprising to find Pennell, in his discussion of 1939, saying "These three species in constancy of characters, lack of intergradation, and differing areas of occurrence seem to me amply distinct specifically. After a long probation *Polygala ambigua* is now generally so recognized" (p. 378). The surprise is not that Pennell considers them three species; it is at the statement that "*Polygala ambigua* is now generally so recognized" [as "amply distinct specifically"] for this implies a universality of judgment which is hardly consistent with recent practice. It is true that authors immediately following Nuttall and with inadequate material so treated it. It is also, as would be expected, true that it is maintained by Britton and Small, as well as by Pennell. But it will be admitted that all of these authors have viewed the genus from a somewhat local standpoint. It may be equally said that, in his Manual, Asa Gray was viewing the genus locally, but by his 3d edition (1862) he had become skeptical, saying of *P. ambigua* "nearly as in No. 9 [*P. verticillata*] (of which it is probably a mere variety)" and later on he flatly so treated it. Chodat's *Monographia Polygalacearum* (1891) can hardly be called a provincial treatment. Chodat viewed all the known species of the world; yet he saw nothing specific about the characters of *P. ambigua*. He treated it as *P. verticillata*, var. *ambigua*. Similarly Blake's monograph of all the species of *Polygala* in North America is broad-gauge in its specific concept and area; yet here (N. Am. Fl. xxv[5]. 348) *P. ambigua* is treated only as a variety of *P. verticillata*. The counting up of specialists to make a total by

whom *P. ambigua* is generally recognized as a species is subject to the factors which affect many other statistics. Since my own experiences have abundantly shown me that *P. ambigua* and *P. verticillata* frequently intergrade, I do not find myself in the "general" group referred to by Pennell, which excluded Asa Gray (in his more mature years), Chodat and Blake.

*ACALYPHA OSTRYAEFOLIA Riddell. DINWIDDIE COUNTY: steep weedy bank by freight-yard of Norfolk & Western Railroad, Petersburg, no. 10,703.

Although stated to occur from New Jersey to Florida and westward, there is no other material in the Gray Herbarium from the Atlantic states north of South Carolina. *Acalypha caroliniana* Ell., not Walt., is referred to *A. ostryaefolia*. Elliott knew it only from Paris (or Parris) Island in Beaufort County, South Carolina "in cultivated land . . . very rare". Messrs. Godfrey and Tryon found it as a weed about Georgetown, South Carolina, in 1939. See p. 369.

EUPHORBIA POLYGONIFOLIA L. NEW KENT COUNTY: sandy beach of York River, near mouth of Fillbate's Creek, north of Holly Forks, no. 11,584.

Inland extension from the sandy coast. See p. 400.

E. PROSTRATA Ait. DINWIDDIE COUNTY: cinders of freight-yard of Norfolk & Western Railroad, Petersburg, no. 10,704; roadsides and waste places, Petersburg, no. 11,367.

Previously found, as a street-weed in Williamsburg, by Grimes. See p. 369.

E. DENTATA Michx. PRINCE GEORGE COUNTY: cinders of freight-yard, Norfolk & Western R. R., east of Petersburg, no. 11,366. HENRICO COUNTY: waste places and railroad ballast, Richmond, no. 12,393.

*E. HETEROPHYLLA L. DINWIDDIE COUNTY: roadsides and waste places, Petersburg, no. 11,072.

Not previously represented in the Gray Herbarium from north of South Carolina. See p. 390.

ILEX CORIACEA (Pursh) Chapm. NANSEMOND COUNTY: wet woods near lumber camp of Camp Lumber Co., Great Dismal Swamp, southeast of Whitemarsh School, nos. 10,718 and 11,587.

Shrubs up to 3 m. high. The black drupes become pulpy and juicy when ripe and promptly drop. Branches heavily loaded

with young drupes in July had lost all but a few lingering ripe ones in October—an unusual character in the genus and one which has not been emphasized. See pp. 368 and 400.

*Ceanothus americanus L., var. intermedius (Pursh) Trel. Southampton County: dry sand, pine barrens about 7 miles south of Franklin, no. 7527. Nansemond County: white sand of pine and oak woods and clearings near Cathole Landing, west of Factory Hill, nos. 11,370 and 12,130.

Characteristic of these dry white sands. Trelease, in Gray's Synoptical Flora, gave the range: "Tennessee . . . and S. Carolina . . . to Louisiana . . . and Florida". Small (Man.) gives it, as *C. intermedius*, the range, "Fla. to La., Tenn. and Ga." Although extending northward into the pinelands of southeastern Virginia and well known on the sands of Middle Cape Cod,[10] var. *intermedius* seems to be lacking between Virginia and southeastern Massachusetts.

Ampelopsis arborea (L.) Koehne. To the very few known stations in eastern Virginia add the following. Southampton County: rich sandy and loamy woods along Three Creek, northwest of Carey Bridge, no. 10,327. Isle of Wight County: waste ground, near Lee's Mill, no. 12,407. Princess Anne County: damp sandy woods, Cedar Island, no. 12,406.

*Vitis Labrusca L., var. **subedentata,** var. nov. (tab. 637), foliis subtus densissime pannosis vix sublanatis, marginibus subedentatis humeris plerumque latis vix elongatis.—Coastal Plain, southeastern New York to Virginia. New York: Fisher's Island, August 10–15, 1920, *St. John*, no. 2811. New Jersey: roadside along creek, Turnersville, Gloucester Co., June 24, 1922, *R. R. Dreisbach*, no. 2,105; moist places, Pleasantville, October 7, 1923, *Tidestrom*, no. 11,398. Maryland: along canal, Chesapeake City, August 2, 1923, *Tidestrom*, no. 11,548. Virginia: swampy thicket southeast of Charles City, Charles City County, August 22, 1939, *Fernald & Long*, no. 11,074 (type in Herb. Gray); border of gum swamp, west of Pungo, Princess Anne County, May 6, 1935, *Fernald & Griscom*, no. 4454; wet peaty clearings in woods of *Pinus serotina*, south of Grassfield, Norfolk County, August 4 and 5, 1934, *Fernald & Long*, no. 4027; border of swampy thicket near Cornland, Norfolk County, June 18, 1935, *Fernald, Griscom & Long*, no. 4669; moist thicket about 5 miles east of Burgess Station, Dinwiddie County, August 26, 1939, *Fernald & Long*, no. 11,075; roadside bordering swampy woods, north of Whitemarsh School, Nansemond County, August 20, 1939, *Fernald & Long*, no. 11,073. See p. 390.

[10] Fernald, *The Cape Cod Ceanothus*, Rhodora, xxxii. 161 (1930).

Typical *Vitis Labrusca,* as shown by the Linnean type (PLATE 636, FIG. 1) is the wide-ranging vine with leaf-margin coarsely dentate and with more or less porrect lobes or shoulders on the fruiting portions of the branches. This is the common form from Maine to southern Michigan, south (southward chiefly in the Piedmont and mountains, though reaching the Coastal Plain in South Carolina) to Georgia and Tennessee. The dense blanket of pubescence is relatively loose, the tangled hairs often distinctly showing under slight magnification (PLATE 636, FIG. 5). The Coastal Plain var. *subedentata* has the margins of leaves accompanying inflorescences with only obsolescent teeth, the subuli at the ends of the stronger veins relatively short, the shoulders usually poorly developed and rounded or broad and subhorizontal, and the dense felt of the lower surface very close and fine, its component hairs scarcely discernible under slight magnification (PLATE 637, FIG. 3). In fact the lower surface glistens as if varnished and in pressing it leaves a heavy brown varnish-like stain on the specimen-sheets. In Virginia var. *subedentata* matures and drops its fruit by late August.

PLATE 636 shows, as FIG. 1, a portion of the TYPE, × 1, of *Vitis Labrusca,* from a photograph received from Mr. Savage. FIGS. 2–4 are leaf-margins, × 1, from different specimens: FIG. 2 from Bedford County, Virginia, May 20, 1871, *A. H. Curtiss;* FIG. 3 from Chilmark, Martha's Vineyard, Massachusetts, *Inez P. Mayhew;* FIG. 4, from Granville, Massachusetts, *F. C. Seymour,* no. 303. FIG. 5 shows the pubescence of the lower surface, × 10, of a mature leaf from Milton, Massachusetts, *C. E. Faxon.*

In PLATE 637, FIG. 1 is a portion of the TYPE, × 1, of var. *subedentata.* FIG. 2 is a leaf, × 1, from Chesapeake City, Maryland, *Tidestrom,* no. 11,548; FIG. 3, pubescence of lower surface, × 10, from the TYPE.

*SIDA **inflexa,** sp. nov. (TAB. 638, et TAB. 639, FIG. 1–3), perennis; caule minute stellato-puberulo 0.6–1.2 m. alto, ramis laxe adscendentibus; foliis lanceolato- vel lineari-oblongis breviter petiolatis, primariis 2.5–6 cm. longis, 0.4–2 cm. latis pagina superiore viridi sparsissime stellato-strigosa vel glabrata pagina inferiore pallida remote stellato-puberula, margine adpresso-serratis vel porrecto-dentatis; floribus plerumque corymbosis terminalibus et ad ramorum apices vel rare axillaribus pedunculis ad 1.7 cm. longis; calycibus 6–10 mm. longis basi plus minusve villoso-hirsutis, lobis deltoideo-acuminatis; petalis late obovatis inaequaliter obcordatis 1.5 cm. longis flavescentibus basin versus valde striatis; carpellis ca. 10, apice valde inflexis, maturis 3–3.5 mm. altis horizontaliter costato-reticulatis dorso viridibus hispidisque apice valde incurvatis plus minusve bidentatis, dentibus brevibus adscendentibus.—Southeastern Virginia, west-central Tennessee,

Alabama and southeastern Missouri. Virginia: Petersburg, Dinwiddie County, *Tuomey;* dry pine woods just east of the "fall-line", along Nottoway River, Double Bridge, about 6 miles northwest of Jarratt, Sussex County, August 18 and September 21, 1939, *Fernald & Long*, nos. 11,076 and 11,372; border of sandy woods near Three Creek, northwest of Carey Bridge, Southampton County, August 19, 1939, *Fernald & Long*, no. 11,077, September 23, 1939, *Fernald & Long*, no. 11,373 (type in Gray Herb.; isotype in Herb. Phil. Acad.). Tennessee: cedar barrens, Lavergne, Rutherford County, May and September, 1882, *Gattinger*. Alabama: locality not stated, *Buckley*. Missouri: Stoddard County, September 12, 1893, *Bush*, no. 5; sands, Campbell (Stoddard County), September 9, 1910, *Bush*, nos. 6293 and 6293A.

Sida inflexa has been passing as *S. Elliottii* Torr. & Gray (see p. 382). That species rests primarily upon *S. gracilis* Ell. Sk. i. 159 (1816), not Richard. It was beautifully described by Elliott, from "the Sea Islands. Common about Beaufort" with "Stem . . . glabrous; leaves linear . . .; peduncles solitary, axillary . . .; capsules (10) two horned, glabrous." It is the very narrow-leaved plant occurring from southeastern South Carolina to southern Florida and Alabama, with nearly glabrous (often bushy-branched) stems 1.5–8 dm. high; linear cauline leaves mostly 1.5–5 cm. long and 1.5–7 mm. broad; flowers mostly solitary in the axils and on peduncles up to 2.5 cm. long; calyx at most strigose on the ribs at base; carpels (plate 639, fig. 4) with prominent erect teeth, glabrous or nearly so on the back and with relatively weak cross-ribs on the sides.

Sida inflexa is also related to the nearly glabrous *S. rubro-marginata* Nash in Bull. Torr. Bot. Cl. xxiii. 102 (1896) of Florida. In foliage the two are similar, but with quite different toothing. *S. inflexa* has the flowers chiefly in terminal corymbs, *S. rubro-marginata* axillary. *S. inflexa* has the calyx (pl. 638, fig. 4) villous-hirsute on the ribs at base, *S. rubro-marginata* (pl. 639, fig. 5) not; and the long erect teeth and quite different reticulation of the carpels (pl. 639, fig. 6) of the latter species show that *S. inflexa* can hardly be forced into it, even by those most modern of young taxonomists who are so frequently maintaining that characters of the carpels, achenes and spores are unimportant as compared with shape of the foliage.

Photo. H. G. Fernald.

Vitis Labrusca, var. subedentata: fig. 1, portion of type, × 1; fig. 2, leaf from Maryland; fig. 3, lower surface of leaf, × 10, from type.

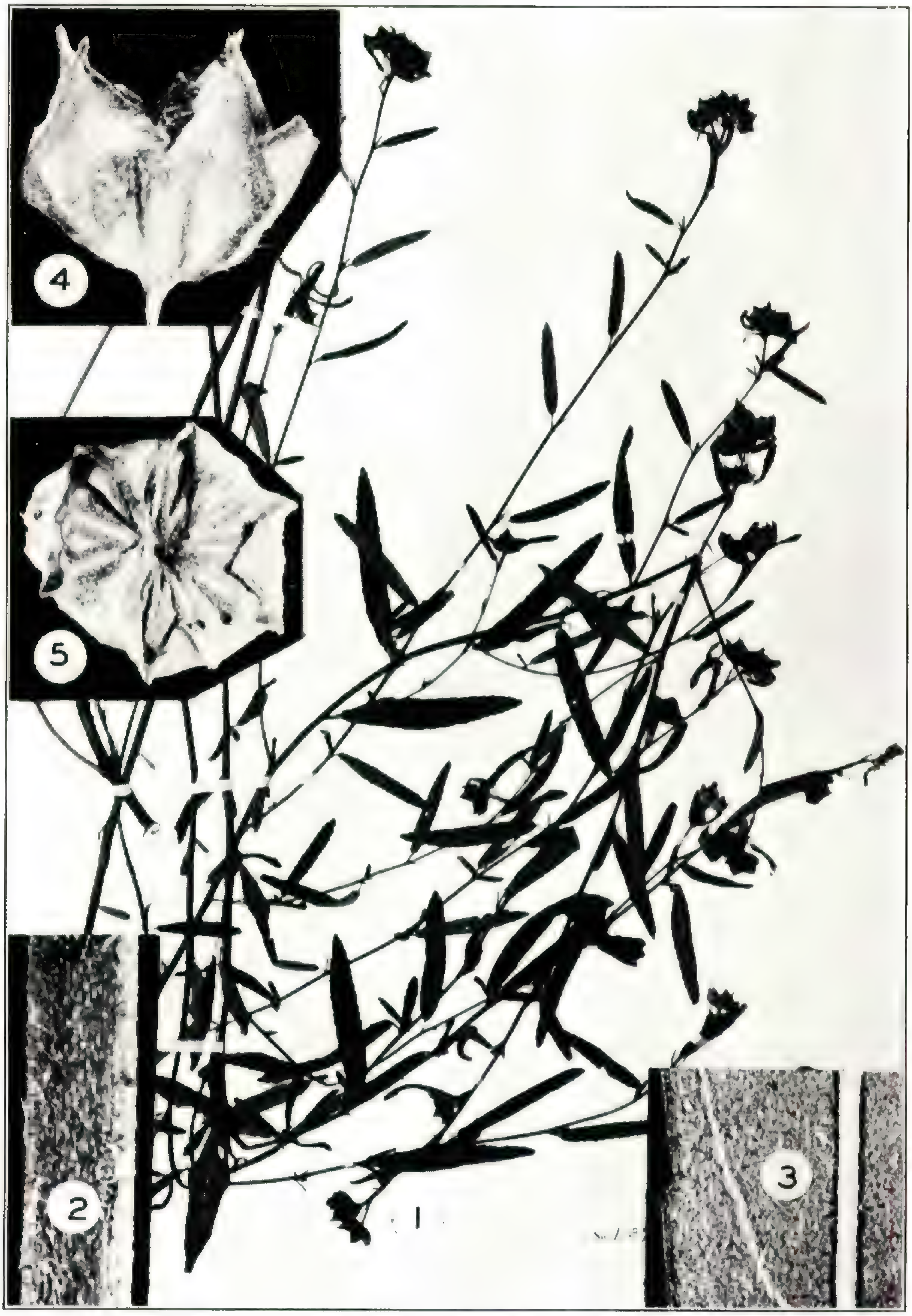

Photo. W. H. Hodge.

SIDA INFLEXA: FIG. 1, TYPE, × 2/5; FIG. 2, portion of stem, × 10, from TYPE; FIG. 3, lower surface of leaf, × 10, from TYPE; FIG. 4, calyx, × 4, from the side, from TYPE; FIG. 5, ring of carpels, × 4, from above, from TYPE.

Sida inflexa is also somewhat related to *S. neo-mexicana* Gray and to *S. Lindheimeri* Engelm. & Gray, especially in its stellate-puberulent stems. *S. neo-mexicana,* however, is a lower plant, with cinereous lower leaf-surfaces and calyx, the latter much lower than in *S. inflexa,* the petals short, and the muticous carpels (PL. 639, FIG. 7) without the transverse ribs which are so prominent in *S. inflexa. S. Lindheimeri* has the flowers chiefly on long axillary peduncles, the very large calyx cinereous, the carpels (PL. 639, FIG. 8) with erect cinereous teeth and with obliquely ascending elongate reticulation. *S. inflexa* in its less cinereous pubescence, its terminal corymbs, villous-hirsute base of calyx, and horizontally costate carpels with short (or no) hispid teeth is quite distinct from either *S. neo-mexicana* or *S. Lindheimeri.*

It is noteworthy that all these species have at one time or another been included under *Sida Elliottii.* The old specimen of *S. inflexa* from Petersburg, Virginia, and Bush's plants of it from southern Missouri are the bases for the inclusion of *S. Elliottii* in Gray's Manual, ed. 7; the Missouri and Tennessee material of *S. inflexa* was cited in the Synoptical Flora as *S. Elliottii. S. neo-mexicana* was placed in *S. Elliottii* in Gray's Plantae Wrightianae and in Torrey's Botany of the Mexican Boundary; *S. Lindheimeri* was first treated as *S. Elliottii, β texana* Torr. & Gray; and *S. rubro-marginata* of Florida was dismissed by Robinson in the Synoptical Flora, with the comment: "*S. rubro-marginata* . . . appears to be merely a broad-leaved form of *S. Elliottii.*" Abundant material now at hand indicates its specific distinction from the latter. See p. 382.

PLATE 638, FIG. 1, shows the TYPE of *Sida inflexa,* × 2/5; FIG. 2, portion of stem, × 10, covered with puberulence; FIG. 3, lower surface of leaf, × 10; FIG. 4, calyx, × 4, from the side; FIG. 5, ring of carpels, × 4, from above; all from TYPE or topotype. In PLATE 639, FIGS. 1–3 are details of *S. inflexa:* FIG. 1, a pressed flower, × 2 (margins reinforced by pencil), from Nottoway River, Double Bridge, Virginia, *Fernald & Long,* no. 11,076; FIGS. 2 and 3, carpels, × 10, from the TYPE. In PLATE 639 the remaining figures are details of related species: FIG. 4, carpel, × 10, of *S. Elliottii* Torr. & Gray from Miami, Florida, *A. H. Curtiss,* no. 5853; FIG. 5, calyx and ring of carpels, × 4, from ISOTYPE of *S. rubro-marginata* Nash, Tampa, Florida, *Nash,* no. 2472; FIG. 6, ripe carpel, × 10, of *S. rubro-marginata* from Punta Rossa, Florida, 1878, *Garber;* FIG. 7, ripe carpel, × 10, of *S. neo-mexicana* Gray, from the TYPE, eastern New Mexico, *Wright;* FIG. 8, ripe carpel, × 10, of *S. Lindheimeri* Engelm. & Gray, from the TYPE, Texas, 1843, *Lindheimer,* no. 24.

Hibiscus militaris Cav. Local range extended to New Kent County: bottomland woods by Chickahominy River, north of Long Bridge, southeast of Quinton, no. 11,371.

Stewartia Malachodendron L. To the few known Virginian stations add one in Norfolk County: dry woods of a "hammock", Great Dismal Swamp, west of Yadkin, nos. 11,078 and 12,131, many tree-like shrubs up to 6 m. high.

*Hypericum mutilum L., var. latisepalum Fernald. King William County: fresh tidal shore of Mattaponi River, at Horse Landing, near King William Courthouse, no. 11,590.

Heretofore known only from Florida to Texas. See p. 402.

H. Drummondii (Grev. & Hook.) T. & G. Greensville County: border of cultivated argillaceous field, northwest of Taylor's Millpond, no. 11,080; open argillaceous border of wood-road northeast of Gaskins, no. 11,081.

The plump capsules burst under slight pressure, pushing out their masses of ripe and unripe seeds. The colored children, knowing the plant as "Nits and Lice", demonstrated this feature to us. They repudiated the very common and slender-fruited *H. gentianoides* as a member of the same group because it had "no lice", the capsules being soft and unresponsive. The fact that they so sharply differentiated *H. Drummondii* indicates that it is less uncommon than we had supposed.

*Elatine americana (Pursh) Arn. King William County: fresh tidal shore of Mattaponi River, at Horse Landing, near King William Courthouse, no. 11,588. James City County: tidal mud along Powhatan Creek, north of Jamestown Island, no. 11,083. See pp. 386 and 401 and map 18.

Extension south from the estuary of the Delaware.

*Viola triloba Schwein., var. dilatata (Ell.) Brainerd. Southampton County: rich sandy loam of woods by Blackwater River, northeast of Ivor, no. 10,735; rich mixed and deciduous woods near Nottoway River, above Carey Bridge, no. 10,336.

First northeast of western North Carolina. See p. 363.

V. esculenta Ell. To the two stations recorded add one in Nansemond County: abundant and very large, along a ditch bordering wet woods and clearings near lumber camp of Camp Lumber Co., Great Dismal Swamp, southeast of Whitemarsh School, no. 11,591. See p. 400.

V. emarginata (Nutt.) LeConte, var. acutiloba Brainerd. To the few recorded stations add one in Southampton County: border of dry mixed woods by Applewhite's Church, no. 10,337.

V. STRIATA Ait. PRINCE GEORGE COUNTY: rich wooded slope by James River, Indian Point, nos. 11,087 and 11,874.

Our first station on the Coastal Plain of a characteristically inland species. See p. 382.

AMMANNIA KOEHNEI Britton. To the single recorded Virginian station (on York River) add the following in PRINCESS ANNE COUNTY: brackish to fresh marsh along Back Bay, at eastern margin of Long Island, nos. 10,741 and 11,088; similar habitat, Cedar Island, no. 12,416. See p. 370 and MAP 4.

GAURA BIENNIS L. PRINCE GEORGE COUNTY: sandy shore of James River, City Point, no. 11,094.

Our first Coastal Plain station.

ERYNGIUM AQUATICUM L. Very characteristic of fresh tidal shores and marshes at least from the James River to the Mattaponi (many nos.). See p. 386.

SANICULA CANADENSIS L., var. **grandis,** var. nov., a var. genuina recedit foliis amplioribus et fructibus crassioribus; folii petiolati imi foliolis longioribus 5.5–13 cm. longis, folii subsessilis, imi foliolis longioribus 4.5–12 cm. longis; fructuum triadibus 1–1.5 cm. latis.—Rich woodlands, western Vermont to Nebraska, south to North Carolina, Tennessee, Missouri, Oklahoma and Texas. TYPE from Bristol, Vermont, July 25, 1898, *Ezra Brainerd* (in Herb. Gray.).

Sanicula canadensis consists of three strongly marked varieties, as follows.

S. CANADENSIS L., var. **genuina.** *S. canadensis* L. Sp. Pl. 235 (1753) in part, as interpreted by Gray, Bicknell and later authors. Larger leaflets of the well developed petioled leaves 3.5–8 cm. long, 1.5–4(–5) cm. broad; larger leaflets of lower subsessile leaves (at lower fork of stem) 3–7 cm. long; triads of fruits (including tips of bristles) 7–9 mm. broad.—Open woods, Florida to Texas, north to Rockingham County, New Hampshire, Plymouth, Bristol and Dukes Cos., Massachusetts, central and southern Connecticut, Long Island, New Jersey, Pennsylvania, West Virginia, Ohio, Kentucky, Missouri and Oklahoma.

This is the common plant of eastern Virginia.

*Var. GRANDIS Fernald (supra). Var. *typica* H. Wolff in Engler, Pflanzenr. iv^{228}. 67 (1913), not *S. canadensis* L., as shown by the plants known to and cited by Linnaeus. Larger leaflets of well developed petioled leaves 5.5–13 cm. long, 2.5–6(–8) cm. broad; larger leaflets of lower subsessile leaves (at lower fork of stem) 4.5–12 cm. long; triads of fruits 1–1.5 cm. broad.—Of broad inland range (see above).

Our only Coastal Plain stations in Virginia are along the James. Prince George County: wooded bank of James River, City Point, no. 10,343 (plants up to 1.7 m. high). Surry County: rich calcareous wooded slopes along James River, Claremont Wharf, no. 10,344.

Var. floridana (Bickn.) H. Wolff, l. c. 67 (1913). *S. floridana* Bickn. in Bull. Torr. Bot. Cl. xxiv. 581 (1897). Smaller throughout; the abruptly cuneate small leaflets with firm spinulose teeth; larger leaflets of petioled leaves 2–5 (rarely –8) cm. long; triads of fruit 5–7 mm. broad.—Dry sandy woods, Florida to Mississippi, north to southeastern Virginia.

It would be perfectly possible to make a rational argument that the species known as *Sanicula canadensis* L., a southern species unknown in Canada, should be called *S. marilandica* L.; and that we should further reverse the established usage and take up for the more boreal and transcontinental *S. marilandica* of all recent authors the name *S. canadensis*. Such a complete reversal has more than the geographic argument in its favor. On the other hand, it is so evident that Linnaeus was utterly at sea regarding the real characters of the two and so confused the two elements in his writings and memoranda that it cannot be said that his own herbarium and the specimens he saw give unequivocal support to such a reversal. The situation, under the two names, is as follows.

S. canadensis L. The pre-Linnean references are to a Clayton plant of eastern Virginia described by Gronovius and supposed by him to be *Sanicula canadensis, amplissimo laciniato folio* of Tournefort. Tournefort gave no further information; consequently the only pre-Linnean reference of value is that of Gronovius. This account says "Pedunculi infra bifurcaturam caulis longi", thus emphasizing the usual 2 long rays or branches so characteristic of the plant with divaricate and bifurcate inflorescence, the *S. canadensis* of Bicknell, Britton and Robinson & Fernald. But in his own herbarium Linnaeus had a Clayton specimen from Virginia (part of Clayton's much confused no. 28—see below) which Linnaeus definitely marked *S. canadensis*. This is the northern large species, the *S. marilandica* sensu Bicknell et al., and it was presumably what Linnaeus had in mind when he gave the simple comparative phrase of original diag-

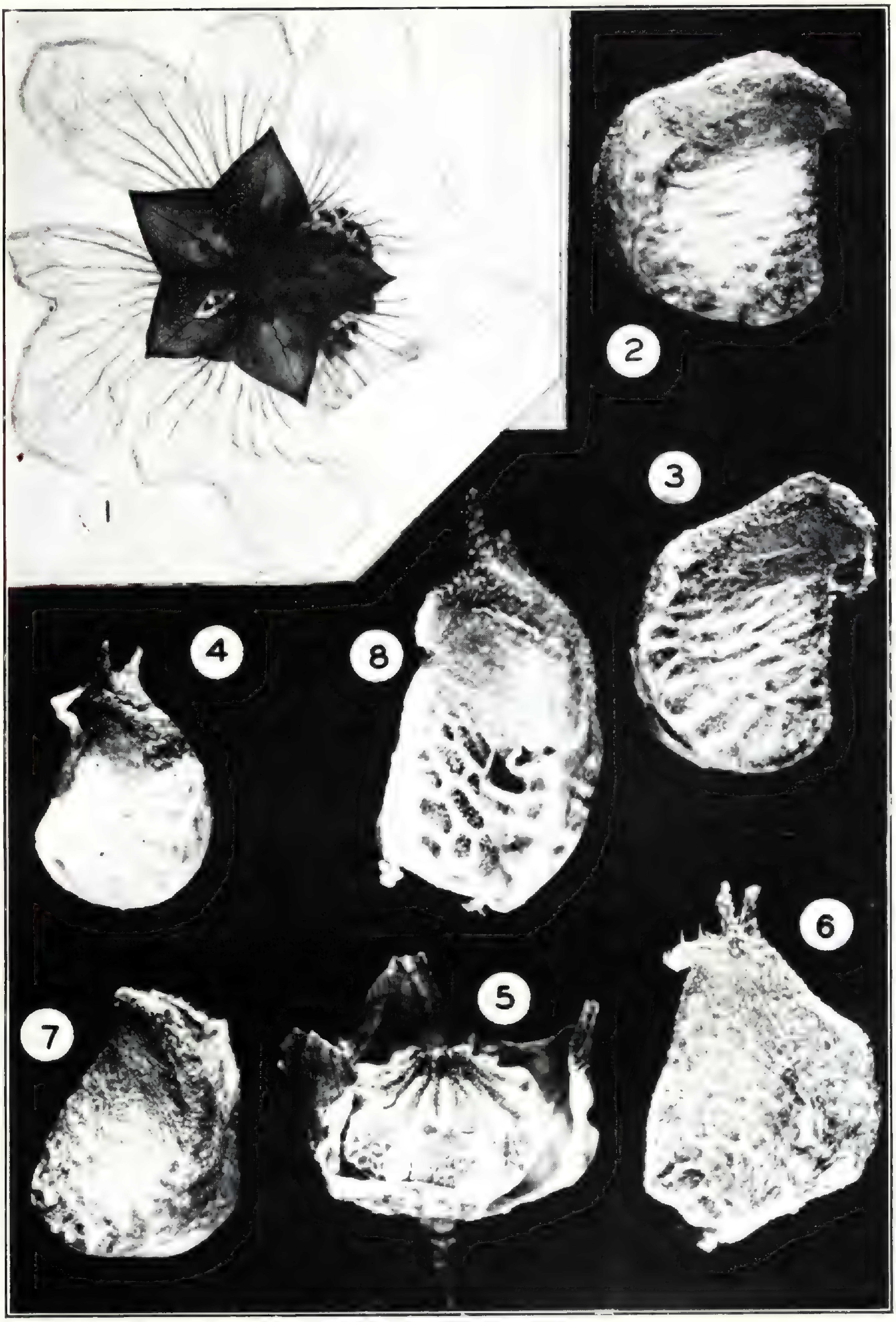

Photo. W. H. Hodge.

SIDA INFLEXA: pressed flower, × 2, from Double Bridge, Virginia; FIGS. 2 and 3, ripe carpels, × 10, from TYPE.

S. ELLIOTTII: FIG. 4, ripe carpel, × 10, from Florida.

S. RUBRO-MARGINATA: FIG. 5, calyx and ring of carpels, × 4, from ISOTYPE; FIG. 6, ripe carpel, × 10, from Florida.

S. NEO-MEXICANA: FIG. 7, ripe carpel, × 10, from TYPE.

S. LINDHEIMERI: FIG. 8, ripe carpel, × 10, from TYPE.

noses: "Structura *ita praecedentis* [*S. europaea*] . . . *sed planta decuplo saepe omnibus partibus major.*" Asa Gray, in his manuscript notes on the Linnean Herbarium, specifically stated that the Linnean specimen of *S. canadensis* has long-exserted styles; and this observation was verified by Mr. Long and me in 1930. At that time, however, another Gronovian (Clayton) plant in the Clayton (Gronovian) herbarium was found to be short-styled *S. canadensis* sensu Bicknell et al. On the portion of the long-styled Clayton material of no. 28 (*S. marilandica* of recent authors) retained in the Gronovian herbarium occurs the original label:

> Sanicle. D. Clayton An. 1734. Num. 28. Claython ex Virginia an 1734. Num. 28. Lappula fere umbellata Astrantiae foliis virginiana. Plukn. Mant. 114.

This was subsequently marked in a second (perhaps clerical) hand: "Sanicula flosculis masculinis pedunculatis, hermaphroditis sessilibus flor. Virg. p. 31", this phrase being the diagnosis given by Gronovius, Fl. Virg. 31, for no. 28, which Linnaeus cited as his basis of *S. marilandica*. This Clayton material with long styles was marked by Asa Gray: "The type of *Marilandica*. A. G." "The greater part of this was given to Linnaeus & he has wrongly named it : *Canadensis*. A. G."

However, there is another sheet of Clayton's no. 28 in the Gronovian herbarium. Mr. Long and I studied it in 1930 and Professor Alfred Rehder then kindly photographed it. This specimen is appropriately discussed under

S. MARILANDICA L. Linnaeus referred to 3 sources and gave no new diagnoses: (1) to Gronovius, p. 31 (*i. e.* Clayton's no. 28, in part at least); (2) to Hortus Upsaliensis; (3) to Ray. Hortus Upsaliensis referred back to the same accounts by Gronovius and by Ray, with 2 other references which were not cited by Linnaeus in Species Plantarum. Gronovius gave the brief diagnosis, "Sanicula *flosculis masculinis pedunculatis; hermaphroditis sessilibus*" and the citation, "*Sanicula sylvatica floribus albis, foliis triscuspidatis. Clayt. n.* 28"; also the reference to Ray which was later cited by Linnaeus.

Ray's account was detailed. It emphasized the *small* (minimis) fruit, the *divaricate* and *dichotomous* branching, the short (pollicares), simple peduncle in the forks, and the pair of leaves

at the forks; all very striking characters of *S. canadensis* sensu Bicknell et al., not of *S. marilandica* of Bicknell et al. One sheet of Clayton's no. **28** has already been discussed. The other bears in the hand of Solander, apparently, the full text from Gronovius, p. 31, which referred to no. **28**. This second sheet is perfectly characteristic of the bifurcate, divaricate-branched, small-leaved and small-fruited, short-styled plant (*S. canadensis* sensu Bicknell) which abounds in eastern Virginia. It is, thus, quite unlike the other sheet of no. **28**, which bears the original annotation by Gronovius.

Since the names *Sanicula canadensis* and *S. marilandica,* as used by Linnaeus, were hopelessly confused, as were the two species as treated by all authors up to Bicknell (1895), we should not lay too much stress upon attempts to retrace the vague mental processes underlying the confusion. Gray decided that the long-styled specimen of no. **28** should stand as *S. marilandica*, the short-styled specimen as *S. canadensis*. Bicknell, the first monographer to clarify the formerly tangled group, followed Gray; and Wolff has followed their interpretations. These decisions should stand. Nothing would be gained by retypifying the species on the basis of early misconceptions.

*Torilis japonicus (Houtt.) DC. Prince George County: waste ground near wharf, City Point, no. **10,354**.

Cited by Coulter & Rose from Baltimore and Washington.

*Lilaeopsis carolinensis Coult. & Rose. Princess Anne County: forming an extensive mat in shallow pool in brackish to fresh marsh along Back Bay, at eastern margin of Long Island, no. **10,758**.

The fourth known station in North America and the first north of southeastern North Carolina; species bicentric, its second area on the drainage-system of La Plata River in eastern South America. See p. **371** and map **6**.

L. chinensis (L.) Ktze. To the few recorded stations add the following. Charles City County: sandy tidal shore of James River, at "Four Oaks", below Harrison Point, no. **11,388**. New Kent County: sandy tidal shore of York River, near mouth of Fillbate's Creek, north of Holly Forks, no. **11,597**. See p. **391**.

*Rhododendron canescens (Michx.) G. Don. King William County: steep wooded bank of Mattaponi River, at Horse

Landing, near King William Courthouse, no. 11,602 (shrubs up to 3 m. high). SUSSEX COUNTY: wooded bottomland, Jones Hole Swamp, west of Coddyshore, no. 10,363 (shrubs 3 m. high); rich woods and bushy clearing just east of the "fall-line", along Nottoway River, Double Bridge, about 6 miles northwest of Jarratt, no. 11,099. SOUTHAMPTON COUNTY: steep wooded slopes by Three Creek, northwest of Applewhite's Church, no. 10,364 (straggling, 0.5 m. high), 10,365 and 11,882 (erect, 1.5 m. high); on steep slope at Round Gut, southwest of Franklin, no. 11,391; rich woods near Raccoon Creek, north of Mill Neck Church, no. 12,427. NANSEMOND COUNTY: damp thicket, steep bank of branch entering Blackwater River, northwest of Duck's Store, no. 12,428. See pp. 361 and 363.

Rehder in Wilson & Rehder, Mon. Azaleas, 144 (1921) gave the range: "from southwestern Tennessee and southern central North Carolina to eastern South Carolina and northeastern Florida to extreme southeastern Texas", etc.

*KALMIA LATIFOLIA L., var. LAEVIPES Fernald in RHODORA, 53 (1940).

With or apart from typical *K. latifolia* in the southeastern counties.

*ZENOBIA PULVERULENTA (Bartram) Pollard. NANSEMOND COUNTY: *Chamaecyparis* swamp in sandy and peaty pine barrens northeast of Sandy Landing, south of South Quay, nos. 12,149 and 12,150. Passing through transitional shrubs (such as no. 12,151) into the green-leaved and commoner

*Z. PULVERULENTA, forma **nitida** (Michx.), comb. nov. *Andromeda speciosa*, var. *α. nitida* Michx. Fl. Bor.-Am. i. 256 (1903); Rehder in Bailey Cycl. Am. Hort. iv. 2007 (1902).—Leaves of fertile branches oval or elliptic-oblong, obtuse, shallowly crenate, green both sides.—In Virginia known from two southern counties. NANSEMOND COUNTY: swampy depressions and *Chamaecyparis* swamps in pine barrens, from northeast of Cox Landing to east of Sandy Landing, south of South Quay, nos. 11,102–11,104, distributed as var. *nuda*, no. 12,152. SOUTHAMPTON COUNTY: swampy woods southeast of Round Gut, southeast of Franklin, no. 11,395 (shrubs up to 3 m. high). Passing into

*Z. PULVERULENTA, forma **nuda** (Ventenat), comb. nov. *Andromeda cassinefolia* Ventenat, Descr. Jard. Cels, 60, t. 60 (1800). *A. cassinefolia*, var. *nuda* Ventenat, Jard. Malmais. ii. 79 (1804). *Z. cassinefolia* (Vent.) Pollard in Bull. Torr. Bot. Cl. xxii. 231 (1895). *Andromeda pulverulenta*, var. *nuda* (Vent.) Schneider, Ill. Handb. Laubholzk. ii. 526 (1911). *Z. pulverulenta*, var. *nuda* (Vent.) Rehder in Mitteil. Deutsch. Dendrol. Gesells.

for 1915: 226 (1915).—Leaves lance-oblong to narrowly ovate, acute at both ends, prominently toothed, green both sides.—In Virginia known only from NANSEMOND COUNTY: with the other forms, *Chamaecyparis* swamp in sandy and peaty pine barrens northeast of Sandy Landing, south of South Quay, no. 12,154.

In western Nansemond County the three forms of *Zenobia* are clearly confluent. Furthermore, among the very few sheets in the Gray Herbarium there are two sent from South Carolina by M. A. Curtis, one the green-leaved with elliptic-oval round-tipped blades, as *Andromeda speciosa* Michx., *a. nitida*, the other of the similar shrub with strongly whitened blunt leaves, as *A. speciosa, β. pulverulenta* and marked, "Mixed helter-skelter with the other". Curtis's experience in South Carolina was obviously like ours in Virginia. As forms they are strikingly different, but they certainly are not geographic varieties, much less two species—the disposition of them by Small. See pp. 385 and 397 and MAP 16.

The application of the names needs clarification.

The first name in the species was apparently *Andromeda pulverulenta* Bartram, Travels, pl. 8, opp. p. 476 (1791), accompanying a crude but recognizable drawing of a flowering branch (crude as to outline and toothing of leaf), with an evident attempt to indicate pulverulence on foliage and branches. There was no word of diagnosis and the name cannot be taken up as adequately published by Bartram. Willdenow, however, Sp. Pl. ii[1]. 610 (1799) properly described the species under Bartram's name, citing the plate, so that the species *Andromeda pulverulenta* properly dates from Willdenow's adequate publication (Bartram ex Willd.); but, whereas Bartram's original plate accompanied the description of "The North West of Cape Fear, here at Ashwood [the old estate of Colonel William Bartram] . . . near three hundred yards over . . . and . . . eighty or ninety miles above the capes", therefore near the inner border of the Coastal Plain of southeastern North Carolina, Willdenow rendered its geographic source as "*Habitat* in Florida."

In 1800, Ventenat, Descr. Jard. Cels, 60, t. 60, described and illustrated *Andromeda cassinefolia*, "Feuilles . . . ovales, dentées et munie d'une glande au sommet de chaque dent, souvent aiguës, quelquefois obtuses, glabres, . . . d'un verd foncé", etc.

The plate shows narrow leaves mostly acute at each end and coarsely toothed, a relatively infrequent extreme, like our no. 12,154. But Ventenat, like Willdenow in case of Bartram's shrub, took the easiest course and said "Arbrisseau découvert par Michaux dans la Florida", although Michaux himself (Fl. Bor.-Am.) cited his own collections as discovered "in Carolina septentrionali, circa *Fayette-Ville* et *Wilmington.*"

Andromeda speciosa Michx. Fl. Bor.-Am. i. 256, clearly described "A. foliis ovalibus, subrotundis, obtusis, crenatis serratisve", is the least rare form of the species, with green, obtuse or round-tipped relatively broad and low-crenate leaves (except on vigorous leaders). Michaux divided his *A. speciosa* into two varieties: var. *α. nitida* (the typical variety) from "circa *Fayette-Ville* et *Wilmington*" and var. "*β. pulverulenta:* Bart. ramis, foliis floribusque pulvere albo inspersis; qui candor certo morbus est . . . in Carolinae utriusque stagnosis." The name *pulverulenta* has been sufficiently considered, except that Ventenat, Jard. Malmais. ii. 79 (1804) treated it as *A. cassinefolia* Vent. (1800), var. *pulverulenta.*

Michaux's *A. speciosa, α. nitida* is the shrub with round-tipped or obtuse green leaves. Although the name var. *nitida* was without diagnosis, Michaux obviously meant it for his typical *Andromeda speciosa.* It was taken in this sense by Rehder in 1902 and I am so considering it.

Small and others, following Willdenow and Ventenat, who respectively ascribed Bartram's locality on Cape Fear River, North Carolina, and Michaux's stations, "in Carolina septentrionali, circa *Fayette-Ville* et *Wilmington*", to "Florida", state the range of *Zenobia cassinefolia* as "Pinelands, Coastal Plain, NE Fla. to N. C." and of typical *Z. pulverulenta* as "Ga. (or Fla.?) to N. C." In the herbarium of the New York Botanical Garden, where one would expect specimens from Florida (Small for many years collecting there), and in the Gray Herbarium the only material (until our Virginia collections) is from North and South Carolina, and at the former institution there is a letter to Dr. Small, stating that in the National Herbarium there is no material from south of South Carolina. "Florida" may safely be dropped from the range. See map 16.

*Vaccinium crassifolium Andr. (*Herpothamnus* Small). Nansemond County: forming extensive carpets in the sandy or peaty pine lands and pine barrens south of South Quay: southwest of Marsh Hill School (less common than at other stations), no. 11,105; east of Cox Landing, nos. 10,774 and 12,160; southeast of Cox Landing, no. 11,604 (fruit, ripe October 15, purple-black, lustrous, soft, juicy, sweet and bland); southeast of Sandy Landing, no. 11,106; 1–1½ miles south of Cherry Grove, no. 11,398. Isle of Wight County: dry sandy pine barrens south of Lee's Mill, no. 11,889.

Extension north from southeastern North Carolina. See p. 379 and map 12.

Pyxidanthera barbulata Michx. To the single station recorded add another, also in Isle of Wight County: dry sandy pine barrens south of Lee's Mill, no. 11,893. Nansemond County: very abundant, with *Vaccinium crassifolium*, in pine barrens south of South Quay, nos. 10,775, 10,776, and 11,716; rare in pineland southwest of Marsh Hill School, no. 11,107. See p. 379.

*Lysimachia producta (Gray) Fernald. Southampton County: bushy swales and borders of swampy woods near Blackwater River, Cobb's Wharf, no. 10,382.

Our first material from south of the District of Columbia, except from western North Carolina. See p. 364.

L. (§ Steironema) radicans Hook. New Kent County: bottomland woods by Chickahominy River north of Long Bridge, southeast of Quinton, no. 11,402. Southampton County: about spring-heads bordering alluvial wooded bottomland of Nottoway River, Cypress Bridge, nos. 10,778, 10,779, 11,109 and 11,401.

In Rhodora, xxxix. 438 (1937), I recorded the Cypress Bridge station and expressed some doubt as to the exact identity. We watched the plant from anthesis through prolonged drowning to maturity, when it set no fruit; there is now no doubt of its identity with the plant of the Mississippi and Gulf drainage. See pp. 366 and 397 and map 3.

*Sabatia angularis (L.) Pursh, forma **cleistantha,** f. nov., corollis minutis tubulosis clausis pallidis.—Greensville County, Virginia: argillaceous and sphagnous meadow northwest of Taylor's Millpond, August 29, 1939, *Fernald & Long*, no. 11,112 (type in Herb. Gray).

S. amoena (Raf.) G. Don. To the few recorded stations add another in Princess Anne County: brackish to fresh marsh

along Back Bay, at eastern margin of Long Island, no. 11,113. See p. 389.

*NYMPHOIDES AQUATICUM (Walt.) Ktze. PRINCESS ANNE COUNTY: shallow water near margin of Salt Pond, no. 10,788, station shown us by the Misses Sally Ryan and Mary Leigh.

FRAXINUS AMERICANA L., var. MICROCARPA Gray. SUSSEX COUNTY: wooded bottomland, Nottoway River, southwest of Homeville, no. 10,389. See p. 361.

Although Small speaks of the small-fruited extreme as having no seeds, our material seems normal. Its fruits are not so small as in the original material from Alabama nor as in Small's collection from Smyth County, Virginia, but decidedly smaller than in the regular run of *F. americana*.

F. PENNSYLVANICA Marsh., var. AUSTINI Fernald in RHODORA, xl. 452, pl. 529, figs. 1 and 2 (1939). CHARLES CITY COUNTY: wooded sandy margin of James River, Wilcox Wharf, no. 11,110.

Our first station on the Coastal Plain of Virginia.

F. PENNSYLVANICA, var. LANCEOLATA (Borkh.) Sarg. GREENSVILLE COUNTY: alluvial woods along Meherrin River, Emporia, no. 11,111.

Our first station on the Coastal Plain of Virginia.

*APOCYNUM SIBIRICUM Jacq. *A. hypericifolium* Ait. See Fernald in RHODORA, xxxvii. 327, 328 (1935). CHARLES CITY COUNTY: sandy beach of James River, southeast of Tettington, no. 11,405. See p. 396.

Woodson in his monograph of the genus, Ann. Mo. Bot. Gard. xvii. 137 (1930), cited nothing from south of Delaware and the District of Columbia.

*AMSONIA TABERNAEMONTANA Walt. SOUTHAMPTON COUNTY: rich mixed and deciduous woods near Nottoway River, above Carey Bridge, nos. 10,790 and 11,895. GREENSVILLE COUNTY: wooded bottomland of Fontaine Creek southeast of Taylor's Millpond, no. 10,394. See p. 359.

Woodson, in his monograph of *Amsonia*, Ann. Mo. Bot. Gard. xv. 405–407 (1928), cited *A. Tabernaemontana* as only escaped from cultivation northeast of South Carolina. Along the Nottoway and Fontaine Creek it is a part of the strictly indigenous flora. The only Virginian material seen by Woodson was from Petersburg "data lacking" and referred by him to var. *salicifolia* (Pursh) Woodson. The variety abounds in rich woods

and clearings along Appomattox River, slightly above the "fall-line" about 2 miles west of Petersburg, no. 11,896.

Acerates floridana (Lam.) Hitchc. To the single known station in Sussex County (now under the plow) add one (now also under the plow!) in Greensville County: very scarce (now deeply buried by clay thrown over it in ditching), peaty swale by Southern Railway northeast of Emporia, no. 11,119.

*Asclepias lanceolata Walt. Princess Anne County: brackish to fresh marsh along Back Bay, Pellitory Point, northeast of Munden, no. 11,117.

As pointed out by me in Rhodora, xxxvii. 438 (1935), the plant of Princess Anne and Norfolk Counties is mostly var. *paupercula* (Michx.) Fernald, with linear leaves. The Pellitory Point station (rather extensive) is the first known to us between northeastern North Carolina and Delaware. See p. 387.

A. purpurascens L. To the single station in Nansemond County add one in Dinwiddie County: rich deciduous woods about old marl-pits east of Burgess Station, no. 10,398.

Breweria humistrata (Walt.) Gray. Local range extended northward and eastward. New Kent County: dry clearing south of Providence Forge, no. 11,407. Surry County: dry thicket north of Surry Courthouse, no. 10,794. Nansemond County: dry sandy woods at Cox Landing, south of South Quay, no. 11,408.

Ipomoea hederacea Jacq., var. integriuscula Gray. To the station in Princess Anne County recorded in 1935 add one in Southampton County: roadside fencerow west of Franklin, no. 11,409.

Phlox Hentzii Nutt. in Journ. Acad. Nat. Sci. Phila. vii. 110 (1834). *P. nivalis* sensu Wherry in Bartonia, no. 11: 8 (1929); probably not of Loddiges, Bot. Cab. viii. no. 780 (1823), without description. Local range extended eastward into Nansemond County: white sand of pine and oak woods and clearings near Cathole Landing, west of Factory Hill, nos. 11,414 and 11,897. See p. 399.

In my earlier papers, without looking carefully into the matter, I erroneously took up the name *Phlox nivalis* Loddiges, in deference to the usage of Dr. Wherry, l. c., and in later papers. When the original source is consulted, however, no adequate description is found. Loddiges showed a branch with a mass of white corollas, the tubes barely exserted from the calyx, and his text was as follows:

No. 780

PHLOX NIVALIS.

Class.	Order.
PENTANDRIA	*MONOGYNIA.*

. . . .

This is a native of Carolina and Georgia. It was sent to us by our excellent friend Dr. Wray, of Augusta, and flowered beautifully the last spring. We think it so different from both subulata and setacea, that it may well form another species.

It is probably not quite hardy: we preserved it very well in a cold frame, and have increased it by cuttings. The soil should be light loam, with a little peat mixed. Like the setacea, it appears to be partly shrubby.

That, of course, is not a diagnosis and, unfortunately, the Loddiges plate (which shows no analyses of the flowers, which would admit it under the International Rules) shows corolla-tubes barely exserted from the calyx, one of the few flowers (at the left) which show the corolla-tube with it exceeding the calyx by only 2 mm. The many sheets in the Gray Herbarium checked by Dr. Wherry as "*Phlox nivalis*" have the long-exserted corolla-tube exceeding the calyx by 7–10 mm. Nuttall's account of *P. Hentzii* had the required diagnosis and a clear discussion of the plant. Its exact geographic source was not given, merely "Sent to the herbarium of the Academy by my friend Mr. Hentz", the plant said to be a "common species in the southern pine barrens." One of Nuttall's original specimens (part of the TYPE) in the Gray Herbarium bears in Nuttall's hand the clarifying data: "Chapel Hill, N. Carolina. *N. M. Hentz*". Material of the magenta-colored form (the only one known in southeastern Virginia) was collected near Chapel Hill on April 4, 1939, by *A. S. Pease* (no. 27,007).

HYDROLEA QUADRIVALVIS Walt. Local range extended eastward to PRINCESS ANNE COUNTY: margin of Stubby Lake, no. 10,797.

HELIOTROPIUM CURASSAVICUM L. To the two stations already recorded add from PRINCESS ANNE COUNTY: open mud and sand along Back Bay, Pellitory Point, northeast of Munden, no. 11,124; similar habitat east of Creeds, no. 11,125. See pp. 369 and 387.

ONOSMODIUM VIRGINIANUM (L.) A. DC. To the few recorded stations add one in SOUTHAMPTON COUNTY: dry sandy pine woods near Nottoway River, above Carey Bridge, no. 10,404. SUSSEX

County: dry open sandy woods and thickets between Littleton and Peters Bridge, no. 12,179; sandy woods near Chub, no. 12,448. See p. 362.

Verbena officinalis L. Dinwiddie County: roadsides and waste places, Petersburg, no. 10,798. Henrico County: waste places and railroad ballast, Richmond, no. 12,451. Princess Anne County: sandy clearing, Ragged Island, no. 12,452.

Our first stations on the Coastal Plain of Virginia; apparently very local.

V. scabra Vahl. To the two stations already recorded add two in Princess Anne County: inner border of brackish to fresh marsh along Back Bay, at eastern margin of Long Island, no. 10,799; sandy clearing, Ragged Island, no. 12,453. See p. 371.

Lippia nodiflora (L.) Michx. To the station (Knott's Island) recorded in 1935 add others, also in Princess Anne County: brackish to fresh marsh along Back Bay, at eastern margin of Long Island, no. 11,126; marsh along Back Bay, eastern margin of Ragged Island, no. 12,454. See pp. 370 and 389.

Trichostema setaceum Houtt. (*T. lineare* Walt.). To the stations in Isle of Wight County recorded in 1937 add from Southampton County: white sand of pine and oak woods north of Point Beach, south of Franklin, no. 11,416; similar habitat, southeast of Wiggins School, no. 11,417. See p. 397.

Pycnanthemum verticillatum (Michx.) Pers. Dinwiddie County: springy sphagnous swale about 5 miles east of Burgess Station, no. 11,131.

Heretofore known in the state only from the western counties. Associated in the swale with other localized species. See p. 390.

Cunila origanoides (L.) Britton. Entering the Coastal Plain in Sussex County: rich woods and bushy clearing just east of the "fall-line" along Nottoway River, Double Bridge, about 6 miles northwest of Jarratt, nos. 11,132 and 11,420. Southampton County: steep wooded slopes by Three Creek, northwest of Applewhite's Church, no. 10,409. See p. 363.

*Hyptis mutabilis (A. Richard) Briq., var. spicata (Poit.) Briq. Dinwiddie County: roadsides and waste places, Petersburg, no. 11,418.

A tropical American species (variety chiefly West Indian) not previously reported from north of Florida. See p. 400.

*Physalis angulata L. Princess Anne County: borders of low woods and clearings along Back Bay, Long Island, nos. 10,811 and 11,137.

Although given a broad range, "Pa. to Minn. and southw." by Robinson & Fernald in Gray, Man. ed. 7, there is no other indigenous material in the Gray Herbarium from north of North Carolina and southern Illinois. In his monograph of the group, Mem. Torr. Bot. Cl. iv. 334 (1896), Rydberg was unable to cite specimens from north of North Carolina. See p. 371.

P. PUBESCENS L. Range extended westward into NANSEMOND COUNTY: wood-road in swampy woods east of Milk Landing, south of South Quay, no. 10,810.

*LYCIUM CHINENSE Mill. DINWIDDIE COUNTY: roadsides and waste places, abundant and rapidly spreading, Petersburg, no. 11,609.

*CYMBALARIA MURALIS Gaertn., Mey. & Scherb. DINWIDDIE COUNTY: abundant on bank by railroad, Petersburg, no. 11,610.

Pennell (Scroph. E. Temp. N. Am. 317) cites no material seen from Virginia.

KICKSIA ELATINE (L.) Dumort. NEW KENT COUNTY: ditch at border of damp woods, near Fillbate's Creek, north of Holly Forks, no. 11,611. HENRICO COUNTY: waste places and railroad ballast, Richmond, no. 12,470. SOUTHAMPTON COUNTY: cinders of freight-siding, Branchville, no. 10,414.

CHELONE GLABRA L., var. ELATIOR Raf. SOUTHAMPTON COUNTY: with *C. Cuthbertii* Small, border of low woods southwest of Cypress Bridge, no. 11,488.

A plant chiefly of the upland, here definitely on the Coastal Plain.

C. OBLIQUA L. SOUTHAMPTON COUNTY: seeping wooded slope bordering bottomland of Three Creek, northwest of Carey Bridge, nos. 11,419 and 11,424.

The only Virginian station (probably the original of Clayton) known to Pennell, l. c., is in Gloucester County. See pp. 363 and 399.

C. CUTHBERTII Small. Local range extended eastward into NANSEMOND COUNTY: wet bushy swale east of Cherry Grove, south of South Quay, nos. 11,138 and 11,614; wet peaty thicket in pine barrens, east of Cox Landing, south of South Quay, no. 11,423. See p. 384.

*BACOPA CYCLOPHYLLA Fernald in RHODORA, xli. 446 (1939) (*Herpestis rotundifolia* Gaertn. fil.). KING WILLIAM COUNTY: very scarce, fresh tidal shore of Mattaponi River, at Horse Landing, near King William Courthouse, no. 11,613.

The eighth known station, connecting that at Wilmington,

North Carolina, with the two in eastern Maryland. See p. 402. and MAP 22.

*Gerardia racemulosa Pennell. Nansemond County: sandy and peaty pine barrens, east of Cox Landing, south of South Quay, nos. 11,145 and 11,433.

Pennell, Scroph. E. Temp. N. A., map 115 (p. 434), indicates no station between the Eastern Shore of Maryland and southeastern North Carolina. *G. racemulosa* seems like a pine-barren extreme of *G. purpurea* L.

*Utricularia biflora Lam. King William County: fresh tidal shore of Mattaponi River, at Horse Landing, near King William Courthouse, no. 11,620. Charles City County: tidal water of Kimage's Creek, Kimage's, no. 11,438. Princess Anne County: shallow pools in brackish to fresh marsh along Back Bay, east of Munden, no. 11,147; similar habitat, east of Creeds, no. 11,148. Sussex County: small sandy pond in woods north of Double Bridge, about 6 miles northwest of Jarratt, no. 11,439.

There is no previous material in the herbarium of the New York Botanical Garden and in the Gray Herbarium from between South Carolina and southern New England. See p. 387.

U. fibrosa Walt. Nansemond County: seepy sandy and peaty open spots in sphagnous savannah-like swale east of Cherry Grove, south of South Quay, nos. 11,618 and 12,186. See p. 403.

There is no previous material in the herbaria of the New York Botanical Garden and of the Philadelphia Academy nor in the Gray Herbarium from between southeastern North Carolina and southern Delaware and New Jersey. Mr. Lloyd G. Carr has reported it (Claytonia, iv. 23) from Augusta County.

U. juncea Vahl. Local range extended to Nansemond County: seepy sandy and peaty open spots in sphagnous savannah-like swale east of Cherry Grove, south of South Quay, no. 11,149. See p. 384.

U. virgatula Barnhart. Local range extended to Nansemond County: with the last, no. 11,150. See p. 384.

*Ruellia strepens L., forma cleistantha (Gray) S. McCoy. Prince George County: wooded swamp by James River south of Indian Point, no. 11,152.

*Diodia teres Walt., var. hirsutior Fern. & Grise. Princess Anne County: sandy fields, Long Island, no. 11,153. Nansemond County: dry white sand of pine barrens, east of Cox Landing, south of South Quay, no. 11,156. Southampton

Photo. H. G. Fernald.

Boltonia asteroides: figs. 1 and 2, portions of type, × 1; fig. 3, two heads, × 2, from Susquehanna River; fig. 4, old head, × 2, to show split receptacle and mature fruit; fig. 5, ripe achene, × 10.

Photo. H. G. Fernald.

BOLTONIA ASTEROIDES, var. GLASTIFOLIA: FIG. 1, plant, × 2/5, from Chickahominy River; FIGS. 2 and 3, heads, × 2; FIG. 4, mature achene, × 10.

County: border of sandy woods southeast of Round Gut, southwest of Franklin, no. 11,442. See p. 389.

D. teres, var. hystricina Fern. & Grisc. Essex County: sandy beach of Rappahannock River at Richmond Beach, southeast of Tappahannock, no. 11,621.

Extension inland from coastal sands. See p. 402.

*Richardia scabra L. Dinwiddie County: railroad cinders, scarce, Collier's Yard, 3–4 miles southwest of Petersburg, no. 11,159. Southampton County: weed in sandy field near Blackwater River, Cobb's Wharf, no. 11,160. Nansemond County: roadside bordering swampy woods north of Whitemarsh School, no. 11,161.

A tropical American species, formerly known northward into North Carolina. See pp. 382 and 383.

*Eupatorium tortifolium Chapm. Nansemond County: dry white sand of pine barrens northeast of Sandy Landing, south of South Quay, no. 11,108; similar habitat, near Cathole Landing, west of Factory Hill, no. 11,448.

Extension north from South Carolina. See pp. 384 and 399.

Kuhnia eupatorioides L. To the few recorded Coastal Plain stations add one in Southampton County: dry hickory and oak woods north of Point Beach, south of Franklin, no. 11,453. See p. 398.

*Carphephorus tomentosus (Michx.) T. & G., var. **Walteri** (Ell.), comb. nov. *Liatris Walteri* Ell. Sk. ii. 285 (1822), at least as to plant described. Isle of Wight County: dry sandy pine barrens south of Lee's Mill, no. 12,486. Nansemond County: sandy and peaty pine barrens northeast of Sandy Landing, south of South Quay, no. 11,173.

With typical pilose-leaved *C. tomentosus* and very distinct from it in its glabrous rosettes and only sparsely pubescent stems. Our plant is definitely what Elliott described from eastern South Carolina as *Liatris Walteri* with "leaves lanceolate, acute, glabrous, dotted, attenuate at base", etc., though Elliott made the error of including *Anonymos uniflorus* Walt. Elliott's note that "This plant appears to form an intermediate species between *L. Bellidifolia* and *Tomentosa*" is significant, but I find little to place it near *Carphephorus bellidifolius;* its characters, except for the glabrous lower leaves, place it with *C. tomentosus.* The late Henry W. Ravenel sent it to Gray as *Liatris Walteri* from Santee Canal and the late M. A. Curtis thus correctly identified

his material from the region of Wilmington, North Carolina. See p. 384.

Solidago fistulosa Mill. Our most inland station is in Southampton County: low woods, very scarce, near the pond, Windman's Mill, south of Sunbeam, no. 11,464. From here eastward it becomes progressively more abundant.

S. Elliottii T. & G. (typical). To the single Virginian station, in Henrico County, recorded in 1939, add the following, in Nansemond County: clearings and borders of wet woods north of Whitemarsh School, nos. 10,831 and 11,625; swampy depressions in pine barrens east of Cox Landing, south of South Quay, no. 10,832; sphagnous savannah-like swale east of Cherry Grove, south of South Quay, nos. 11,463 and 11,626.

S. ulmifolia Muhl. Extending into the Coastal Plain in Charles City County: dry wooded bank of James River at "Four Oaks", below Harrison Point, no. 11,461.

A Synopsis of Boltonia (Plates 640–646).—In September, 1933, on my first trip to Virginia, Mr. Ludlow Griscom and I collected on the tidal marshes of North Landing River a *Boltonia* which did not readily work out by existing treatments of the group. In studying it we found other difficulties in the genus and then prepared a tentative outline of the more significant characters. The completion and publication of this study was delayed until the identity of some types, including those of *Matricaria asteroides* L., basinym of *B. asteroides* (L.) L'Hér., and of *Chrysanthemum carolinianum* Walt., referred by Gray to the synonymy of *B. asteroides*, could be established. The Walter type has not been found; but a sheet compared by Mr. C. A. Weatherby in October, 1935, and a photograph (our pl. 640, figs. 1 and 2) received from Mr. Savage in November of that year clearly settle that *Matricaria asteroides* L. is, as Mr. Griscom and I inferred from the Linnean diagnosis and the source of the type, "Pensylvania", not the wide-ranging series with broad leafy corymbs, extending westward to Illinois and beyond, as Gray inferred, but a local plant chiefly of the Atlantic States, with its chief concentration along the Susquehanna River in Pennsylvania and Maryland, though perhaps extending to northern Ohio, and known from western North Carolina; also with a geographic variety, the true *B. glastifolia* (Hill) L'Hér. (our pl. 641), extending from southern New Jersey along the

coastal areas to Louisiana. Some other conclusions reached by Griscom and me in the winter of 1933–34 are supported by additional collections; other conclusions are altered through new evidence. For instance, the commoner species of southeastern Virginia (PL. 642), tall (up to 2.3 m. high), with small mostly white-rayed heads on the loosely paniculate branches, then not known to us, closely matches Walter's account of his *Chrysanthemum carolinianum* from the region of Charleston; and, fortunately, a collection made by Mr. Robert K. Godfrey in Berkeley County, South Carolina, in September, 1939, is quite like the plant of southeastern Virginia. We are, therefore, safe in considering it Walter's species, the type of which is presumably lost. In many points the outline prepared seven years ago is here adopted, with real regret that his other duties prevent my associate in the original study from continuing it at this time. The two coastwise species (*B. asteroides* and an undescribed one of southeastern Virginia and South Carolina, PL. 643), with broad disks and long lilac ligules, often produce, even at flowering time, well defined subterranean stolons; the tall southeastern species with small usually white-rayed heads (*Chrysanthemum carolinianum* Walt.) has a mass of fibrous roots, with no elongate stolons, at most producing sessile or subsessile superficial basal offsets in late autumn. Similar differences of habit apparently exist in the species of the interior but, most unfortunately, only one or two out of many sheets of specimens of them exhibit carefully dug and washed subterranean parts. Nine-tenths of all the specimens I have seen are hastily broken or snatched fragments without bases. Until properly collected and intelligently laid-out specimens of these plants are available their treatment must be necessarily tentative.

In this study I have been greatly aided by the use of the local material of the Academy of Natural Sciences of Philadelphia, most kindly sent me for examination by Mr. Long.[1]

[1] The following key, like many others published in recent years in my revisionary papers, was made primarily for use in a new edition of Gray's Manual. In some instances such keys published in the past have subsequently appeared (without serious alteration of even minor details) in books COPYRIGHTED by others. If compilers of such books like my keys, the product of weeks or months of concentrated study and of tedious measurements, it is hoped that they will not attempt to place me in the eventual position of having to acknowledge my own work as taken from their copyrighted books.

a. Phyllaries (involucral bracts) linear to linear-attenuate or subulate, 0.2–0.75 (rarely –1) mm. broad; disk 3–8 mm. broad; awns wanting or up to ⅔ as long as achene, shorter than disk-corolla .... *b*.

b. Phyllaries 0.5–1 mm. broad, not long-attenuate nor subulate; ligules 0.8–1.5 cm. long, lilac or purplish; heads few, on strongly ascending to erect naked or few-bracted peduncles; plant often spreading by elongate stolons 1. *B. asteroides*.

b. Phyllaries 0.2–0.4 (rarely –0.5) mm. broad, long-attenuate to linear-subulate; ligules 5–8 mm. long, white or lilac; heads numerous, more or less diffusely paniculate or corymbose .... *c*.

c. Involucre of 2–3 closely imbricated often subequal series of phyllaries, not often extending down the peduncles as bracts; peduncles 0.5–5.5 cm. long; achenes wingless or only narrowly margined .... *d*.

d. Diffusely panicled, the flowering branches and elongate (mostly 1.5–5.5 cm. long) peduncles spreading to loosely ascending; awns wanting or minute (about 0.1 mm. long); achenes narrowly cuneate-obovate.

Base without elongate stoloniferous offshoots; leaves subtending flowering branches narrowly lanceolate to linear-oblanceolate, attenuate to both ends; ligules 5–7 mm. long, white (rarely lilac); disks 3–5 mm. broad; anthers included; awns about 0.1 mm. long .... 2. *B. caroliniana*.

Base bearing elongate stolons; leaves subtending flowering branches narrowly obovate to broadly oblanceolate; ligules 7–8 mm. long, lilac; disks 5–8 mm. broad; anthers soon exserted; awns wanting or nearly so .... 3. *B. Ravenelii*.

d. Strongly corymbose, the leafy corymb with very many erect branches and short peduncles (0.5–2.5 cm. long); awns 0.7–1 mm. long, ½–⅔ as long as the broadly obovate achene .... 5. *B. latisquama*, var. *microcephala*.

c. Involucre of 3–5 unequal series, the lower commonly merging down the peduncle with the numerous small bracts; peduncles stiff and straight, many of them 2.5–15 cm. long; disks 3–5 mm. broad; achenes mostly broadly winged .... 4. *B. diffusa*.

a. Phyllaries (at least the larger) oblong to rhombic or cuneate-obovate, 0.5–2 mm. broad; disk 7–15 mm. broad; awns nearly or quite as long as the obovate achenes, about equaling disk-corollas, mostly 1–2 mm. long; coarse plant with leafy corymb; ligules lilac or white, 1–1.8 cm. long 5. *B. latisquama*.

1. B. asteroides (L.) L'Hér. (Plate 640). Slender, simple or with loosely ascending branches, 2–7 dm. high, with basal offsets and stolons developed in autumn; leaves submembranaceous, linear to oblong-lanceolate or oblanceolate, broad-based, scarcely petioled, the principal ones 2.5–12 cm. long and 3–13 mm. broad; heads 1–23, usually few, on loosely ascending to erect naked or few-bracted peduncles 2.5–11 cm. long; involucre of 2–3 series of subequal linear phyllaries 0.5–1 mm. broad; ligules lilac or pur-

Photo. H. G. Fernald.

Boltonia caroliniana: fig. 1, plant, × 2/5; fig. 2, flowering head, × 2; fig. 3, fruiting heads, × 2; fig. 4, mature achene, × 10.

Photo. H. G. Fernald.

BOLTONIA RAVENELII: FIG. 1, original *Ravenel* material, × 2/5, TYPE at left; FIGS. 2, 3 and 5, heads, × 2; FIG. 4, mature achene, × 10.

plish, 0.8–1.5 cm. long; disk 6–8 mm. broad; achenes obovate, thick-rimmed, about 2 mm. long, the awns wanting or up to 0.7 mm. long.—Sert. Angl. 27 (1788). *Matricaria Asteroides* L. Mant. 116 (1767).—Northwestern New Jersey, eastern Pennsylvania and northern Maryland; western North Carolina; perhaps also northern Ohio. NEW JERSEY: low woods, Brighton, Sussex County, September 4, 1910, *Mackenzie*, no. 4778; border of pond east of Swartswood Lake, Sussex County, August, 1911, *Mackenzie*, no. 4922; muddy calcareous shores and flats, Shyster Pond, Warren County, July 24, 1920, *Mackenzie*. PENNSYLVANIA: TYPE (photograph in Gray Herb., our PLATE 640, FIG. 1) of *Matricaria Asteroides* L., cult. at Upsala from material sent by Bartram from Pennsylvania ("*Habitat* in Pennsylvania. *Barthram*"); banks of Susquehanna, Harrisburg, August, 1858, *Porter;* same locality, without date, *Martindale;* banks of Susquehanna, Lancaster County, August 20, 1862, *Porter* (with memorandum: "quite frequent on the rocky banks and islands of the Susquehanna from Harrisburg southward")—the preceding specimens distributed as *B. glastifolia;* Foster's Island, Harrisburg, August 10, 1888, *Porter;* river-bank, Harrisburg, July 9, 1888, *Small;* islands, York Furnace, September, 1892, *Jos. Crawford;* rocky pools on Bair's Island, York Furnace, June 18–23, 1896, *MacElwee;* mouth of Tucquan, Lancaster County, September, 1892, *A. A. & E. G. Heller*, no. 595; McCall's Ferry, September 5, 1892, *S. Brown*, July 17, 1903, *S. Brown & B. H. Smith*. MARYLAND: rocky islands of Susquehanna River, Conowingo, Cecil County, July 29–31, 1924, *Jos. Crawford;* Havre de Grâce, September 1, 1906, *Long;* ¼ mile south of Havre de Grâce, July 19, 1902, *G. H. Shull*, no. 75. NORTH CAROLINA: sandy roadside, near summit of divide, south of Tuxedo, Henderson County, August 22, 1927, *Wiegand & Manning*, no. 3232.

Two collections from northern OHIO (bay shore, Sandusky, September 28, 1898, *E. L. Moseley*, and Continental, Putnam County, October 1, 1883, *H. A. Young*) seem like the Susquehanna plant but the material is inadequate.

That true *Boltonia asteroides*, as shown by the TYPE, the specimen in the Linnean Herbarium described in Species Plantarum (our PLATE 640, FIGS. 1 and 2), is the slender species of the Susquehanna Valley, eastward into northwestern New Jersey, is apparent, although the name has erroneously been made to cover an assemblage of broadly corymbose and very leafy plants extending westward into the Prairie States. Details of the local eastern species are shown in PLATE 640.

In PLATE 640, FIGS. 1 and 2 are portions, × 1, of the Linnean TYPE of *Matricaria Asteroides*, enlarged from a photograph received from Mr. S. SAVAGE; FIG. 3, two heads, × 2, from Harrisburg, Pennsylvania, August, 1858, *Porter;* FIG. 4, partly denuded receptacle (split), with mature fruit, × 2, from same specimen as FIG. 3; FIG. 5, achene, × 10, from mouth of Tucquan, Lancaster County, Pennsylvania, *Heller & Heller,* no. 575.

Typical *Boltonia asteroides* was early in European botanic gardens, probably derived from the Pennsylvania material sent by Bartram to Linnaeus. A beautiful sheet of it (somewhat overgrown in cultivation) is in the Gray Herbarium, collected by Jacques Gay from plants cultivated in Paris in 1822; and old specimens from other European gardens are there represented.

Near the coast, on muddy shores or in tidal marshes (see p. 396) from southern New Jersey to Louisiana, *Boltonia asteroides* becomes stiffer, with firmer leaves and taller stems, and with more promptly stoloniferous habit. In this plant the principal leaves are narrowed into petiolar bases and the stiffer and straighter peduncles are often more bracteolate. Some specimens of this coastwise plant are a good match (taking into account the fact that it had been in cultivation) for the original plate of *Matricaria glastifolia* Hill, basinym of *B. glastifolia* (Hill) L'Hér. This wider-spread variety becomes

*B. ASTEROIDES (L.) L'Hér., var. **glastifolia** (Hill), comb. nov. (PLATE 641). Freely stoloniferous, the stems up to 1.2 m. high, slender, with erect or ascending branches; leaves coriaceous, the lower narrowly lanceolate or oblanceolate, acuminate or acutish, narrowed to subpetiolar bases; peduncles often more bracteate; awns of achenes well developed.—*Matricaria glastifolia* Hill, Hort. Kew, 19, t. 3 (1769). *B. glastifolia* (Hill) L'Hér. Sert. Angl. 27 (1788).—Southern New Jersey to Louisiana, local. NEW JERSEY: Bennett, Cape May County, September 4, 1907, *Van Pelt;* bog north of creek, Green Creek, Cape May County, August 15, 1909, *Van Pelt;* low ground along railroad, Rio Grande, Cape May County, September, 1911, *O. H. Brown;* clay-bottomed bog, Cold Spring, Cape May County, August 30, 1917, *Gershoy,* no. 701, June 23, 1939, *F. C. Schmid, Jr.* DELAWARE: bogs, Felton, September 25, 1873, *A. Commons;* bogs, Ellendale, August 16, 1877, *A. Commons;* moist open sandy depression east of Ellendale, September 5, 1925, *Pennell,* no. 12,872. VIRGINIA: tidal marsh along Chickahominy River about 5 miles west of Toano, James City County, August 13, 1939, *R. W. Menzel,* no. 311; fresh tidal marsh of Chickahominy River, below Barrat's Bridge (or Ferry), James City County, September 19, 1939, *Fernald & Long,* no. 11,466; brackish marsh of North Landing

River, Pungo Ferry, Princess Anne County, September 22, 1933, *Fernald & Griscom*, no. 2914; Northwest, Norfolk County, September 6, 1893, *Heller*, no. 1248. NORTH CAROLINA: ditch near Old Dock, Columbus County, August 29, 1938, *Godfrey*, no. 6337. SOUTH CAROLINA: Santee Canal, September, —, *H. W. Ravenel*. GEORGIA: edge of nearly fresh marshes of Altamaha River, just below Darien, McIntosh County, September 17, 1903, *Harper*, no. 2003. LOUISIANA: without stated locality, *E. Hall*.

In PLATE 641, FIG. 1 is a plant, × 2/5 from below Barrat's Bridge, James City County, Virginia, *Fernald & Long*, no. 11,466; FIGS. 2 and 3, heads, × 2, from no. 11,466; FIG. 4, achene, × 10, from Pungo Ferry, Princess Anne County, Virginia, *Fernald & Griscom*, no. 2914.

2. *B. **caroliniana** (Walt.), comb. nov. (PLATE 642). Very tall, up to 2.3 m. high, from fibrous roots, without elongate stolons, freely branched with wide-spreading to subascending long paniculate branches; early (soon dropping) lower leaves broadly oblanceolate, membranaceous and blunt; principal cauline leaves at flowering time submembranaceous, lanceolate to linear-oblanceolate, tapering to apex and petiolar base; paniculate branches up to 7 dm. long, leafy, diffusely forking; peduncles filiform, 1.5–4.5 cm. long; involucre of 2–3 close series, the linear-subulate phyllaries only 0.2–0.3 mm. broad; ligules white (rarely lilac), 5–7 mm. long; disks 3–5 mm. broad; achenes narrowly cuneate-obovate, narrow-rimmed; awns minute, about 0.1 mm. long.—*Chrysanthemum Carolinianum* Walt. Fl. Carol. 204 (1788).—Rich and damp soil, southeastern Virginia and eastern South Carolina. VIRGINIA: thicket at margin of exsiccated old mill-pond in Swift Creek, Lakeview, Chesterfield County, September 16, 1938, *Fernald & Long*, no. 9470; alluvial woods, upper terrace of Nottoway River, southwest of Burt, Sussex County, September 20, 1937, *Fernald & Long*, no. 7678; alluvial woods, Nottoway River, southwest of Lambs, Sussex County, September 20, 1937, *Fernald & Long*, no. 7679; bushy swale 1½ miles east of Stony Creek, Sussex County, August 24, 1938, *Fernald & Long*, no. 9187; swale at border of woods, 4 miles south of Stony Creek, August 19, 1936, *Fernald, Griscom & Long*, no. 6716; same station, October 18, 1936, *Fernald & Long*, no. 6716*a* (fruiting branchlets); swampy woodroad northeast of Gaskins, Greensville County, August 29, 1939, *Fernald & Long*, no. 11,180; argillaceous and siliceous alluvium, bottomland of Nottoway River near Courtland, Southampton County, June 23, 1936, *Fernald, Long & Smart*, no. 5936 (young foliage); sandy wooded bottomland of Nottoway River, Courtland, August 25, 1936, *Fernald & Long*, no. 6717; wooded bottomland of Meherrin River, near Haley's Bridge, Southampton County, August 19, 1938, *Fernald & Long*, no. 9186. SOUTH CAROLINA:

Cooper River, Berkeley County, October, 1847, *Cranmore Wallace;* clearing along logging railroad, floodplain forest, along Santee River, 3 miles northeast of Pineville, Berkeley County, September 11, 1939, *Godfrey,* no. 8155.

This tall and paniculately branched species, with usually white ligules, the lanceolate leaves attenuate to base and commonly to apex, agrees far better than other Atlantic-slope species with Walter's description of his *Chrysanthemum carolinianum.* Walter's account was as follows:

Carolinianum 1. foliis lanceolatis integris utrinque acuminatis laevibus, caule 5 ad 6-pedali ramosissimo, floribus radio albis disco luteo.

Walter lived on Santee River. We now have two collections of the tall much branched plant with leaves "utrinque acuminatis" and with white rays from that region. Even if the Walter type is never found the identification seems quite safe.

In PLATE 642, FIG. 1 is a plant, × 2/5, from east of Stony Creek, Sussex County, Virginia, *Fernald & Long,* no. 9187; FIG. 2, flowering head (white ligules scarcely showing), × 2, from no. 9187; FIG. 3, fruiting heads, × 2 from south of Stony Creek, *Fernald & Long,* no. 6716[a]; FIG. 4, achene, × 10, from no. 6716a.

3. *B. **Ravenelii** Fernald & Griscom, sp. nov. (TAB. 643), planta 2–8 dm. alta paniculato-ramosa basi stolonifera; foliis primariis membranaceis anguste obovatis vel late oblanceolatis obtusis vel subacutis basi subpetiolatis 6–10 cm. longis 1–3 cm. latis; paniculis elongatis subcylindricis 1.5–5.5 dm. longis 1–1.8 dm. diametro, ramis patento-adscendentibus foliosis paucifloris; pedunculis sparse bracteolatis rectis 2–5 cm. longis; phyllaribus lineari-subulatis 0.2–0.4 mm. latis 2–3-seriatis; ligulis lilacinis 7–8 mm. longis; disco 5–8 mm. lato; antheris deinde exsertis; achaeniis vix aristatis.—Rich bottomland woods, very local, southeastern Virginia and eastern South Carolina. VIRGINIA: wooded bottomland of Fontaine Creek, southwest of Haley's Bridge, Greensville County, October 11, 1938, *Fernald & Long,* no. 9642. SOUTH CAROLINA: Santee Canal, September, 1846, *H. W. Ravenel;* rich swamps, Santee Canal, October, —, *Ravenel* (TYPE in Herb. Gray).

A very little known species. The two Ravenel specimens, sent to Asa Gray more than 90 years ago, and the single collection from southeastern Virginia are consistent in their thin and broad leaves, stiffly ascending peduncles, very small involucres,

Photo. H. G. Fernald.

BOLTONIA DIFFUSA, var. INTERIOR: FIG. 1, TYPE, × 2/5; FIGS. 2 and 3, heads, × 2; FIG. 4, mature achene, × 10.

Photo. H. G. Fernald.

Boltonia latisquama: figs. 1 and 2, portions of type, × 1; fig. 3, flowering head, × 2; fig. 4, fruiting head, × 2; fig. 5, mature achene, × 10.

lilac ligules and awnless achenes. The Virginia material, collected very late in the season, has most of the anthers exserted, and this unusual character shows in the older heads of the Ravenel material.

In PLATE 643, FIG. 1 is the original Ravenel material, × 2/5, the TYPE of *B. Ravenelii* at the left; FIGS. 2 and 3, heads, × 2, from the TYPE; FIG. 4, achene, × 10, from the TYPE; FIG. 5, heads, showing exserted anthers, × 2, from Fontaine Creek, southwest of Haley's Bridge, Greensville County, Virginia, *Fernald & Long*, no. 9642.

4. B. DIFFUSA Ell. Very slender, from subterranean rhizomes and stolons, 0.5–1 m. high, the stem 1.5–3 mm. thick at base, diffusely open-paniculate; leaves coriaceous, linear-subulate to broadly linear, only the few lowest dilated, the upper and those of the prolonged simple or only remotely forking ascending branches greatly reduced; peduncles filiform, many-bracteolate, straightish, 2.5–15 cm. long; heads small, remote; involucre of 3–5 unequal series, the lower phyllaries commonly merging down the peduncle into the numerous small bracts; phyllaries linear-subulate, 0.2–0.5 mm. broad; ligules white or lilac, 5–8 mm. long; disk 3–5 mm. broad; achenes cuneate-obovate, broadly winged, the awns about ¼ as long.—Sk. ii. 400 (1823).—Florida and southwestern Georgia to Arkansas, Oklahoma and eastern Texas. FLORIDA: hammock, Okeechobee Region, Brevard Co., October 26, 1903, *Fredholm*, no. 6151; cypress-head, Kelsey City, Palm Beach County, December 16, 1920, *Small, DeWinkeler & Rane*, no. 9814; moist rich soil, swamp, Juno, Palm Beach County, March 7, 1921, *F. R. Randolph*, no. 78; cypress swamp, vicinity of Fort Myers, Lee County, May 22, 1916, *J. P. Standley*, no. 199; river-swamps, Apalachicola, *Biltmore Herb.*, no. 142b. GEORGIA: wet pine barrens, Sumter County, September 8, 1900, *Harper*, no. 616; damp pine barrens near Leesburg, August 30, 1901, *A. H. Curtiss*, no. 6893. MISSISSIPPI: Mendenhall, August 20, 1903, *Tracy*, no. 8538; Deer Island, August 25, 1891, *Seymour & Earle*, no. 191; Deer Island, October 12, 1895, *Tracy*, no. 4778. ARKANSAS: roadside ditch near Hot Springs, August 3, 1935, *F. J. Scully*, no. 66. LOUISIANA: Covington, *T. Drummond*, no. 67; open dry soil, south edge of Hammond, Tangipahoa Parish, June 30, 1938, *D. S. & H. B. Correll*, no. 9256; damp soils, western Louisiana, *Josiah Hale;* moist soil along canal, near Holmwood, Calcasieu Parish, July 18, 1938, *Correll & Correll*, no. 9577. OKLAHOMA: along small streams, San Bois Mts., 1891, *C. S. Sheldon*, no. 280. TEXAS: Dallas, 1873, *Reverchon*, no. 233; Houston, September 14, 1913, *G. L. Fisher;* neglected field, Montgomery Co., July 18–21, 1909, *R. A. Dixon*, no. 492; ponds, Hempstead, June 6, 1872, *E. Hall*, no. 308.

Boltonia diffusa is here taken up in its traditional sense, although Elliott's type has not been studied. The range is usually stated as extending northward into South Carolina. I have seen no material, however, from north of northern Florida and southwestern Georgia, and I am inclined to the interpretation that authors have merely assumed that Elliott's species was described from South Carolina. Elliott's very detailed account states, fortunately, that his species "Grows in damp rich soils between the Chatahouchie and Alabama", *i. e.* somewhere between southwestern Georgia and northwestern Florida and western Alabama. Characteristic material is known from Sumter and Lee Counties, Georgia, in the drainage area of Flint River, which, at the extreme southwest corner of the state, joins the Chattahoochie to form Appalachicola River, whence *B. diffusa* is also known. Until authentic material from South Carolina is known, that state may well be omitted from the range.

Much of the material from the Mississippi valley differs from typical *Boltonia diffusa* in its coarser habit, much more branching stems and rather shorter and stiffer peduncles. Its bases are rarely collected, but the few seen usually show no stolons. This is

B. diffusa Ell., var. **interior** Fernald & Griscom, var. nov. (tab. 644), plerumque estolonifera; caulibus 0.6–1.2 m. altis basi 4–7 mm. crassis paniculato-ramosis, ramibus plerumque valde ramuliferis; pedunculis crassis; phyllaribus lineari-oblongis apice vix subulatis. Kentucky: weed in field, northeast of Murray, Calloway County, July 19, 1937, *Smith & Hodgdon*, no. 4078. Tennessee: dry oak barrens, alt. 1100 feet, Tullahoma, Coffee County, August 24, 1930, *Svenson*, no. 4257 (transition in phyllaries to typical *B. diffusa*, branching and fibrous roots of the var.). Mississippi: old field near Jackson, September 6, 1885, *John Donnell Smith:* Cat Island, August, 1900, *Tracy*, no. 485. Illinois: Odin, 1860, *Geo. Vasey;* De Soto, August, 1862, *Vasey* (type in Herb. Gray). Missouri: Springfield, August 31, 1888, *Blankinship.* Arkansas: waste, level cotton-land, Brinkley, Monroe County, August 28, 1934, *Delzie Demaree*, no. 10,858; bottoms, Arkansas River, Pine Bluff, October 24, 1931, *Demaree*, no. 8786; Texarkana, Miller County, September 8, 1898, *A. A. & E. G. Heller*, no. 4229 (transitional). Oklahoma: near edge of pond in woods, near Copan, Washington County, August 15, 1913, *G. W. Stevens*, no. 2094, as *B. latisquama.*

Var. *interior* is a perplexing plant, in its less extreme develop-

ment clearly belonging near if not with *Boltonia diffusa*, but in extreme forms approaching small-headed extremes of *B. latisquama*. Fuller material, especially with carefully collected root-systems, is important to clarify the relationship here.

In PLATE 644, FIG. 1 is the TYPE, × 2/5, of *Boltonia diffusa*, var. *interior;* FIG. 2, heads, × 2, from TYPE; FIG. 3, mature head, × 2, from Tullahoma, Tennessee, *Svenson*, no. 4257; FIG. 4, achene, × 10, from no. 4257.

5. B. LATISQUAMA Gray (PLATE 645). Coarse, 0.7–1.5 m. or more high, the base apparently not stoloniferous; stem strongly corymbose-paniculate and leafy, conspicuously corrugated; leaves firm, the primary ones lanceolate, those of the corymbose branches linear-attenuate and much smaller; peduncles leafy-bracted, 1.5–5 cm. long; involucre of about 3 series of firm narrowly cuneate- to spatulate-obovate short-tipped phyllaries 1–2 mm. broad; ligules white or lilac, 1–1.8 cm. long; disk 7–14 mm. broad; achenes obovate, 2.5–3 mm. long, broad-winged; awns 1.5–2 mm. long.—Am. Journ. Sci., ser. 2, xxxiii. 238 (1862).—Prairies and banks of streams, Missouri, Kansas and Oklahoma, probably Texas; escape from cultivation eastward to New England.

In PLATE 645, FIGS. 1 and 2 are portions of the TYPE, × 1, from near the mouth of the Kansas River, *Parry;* FIG. 3 is a characteristic head, × 2, from Baker, Lincoln County, Oklahoma, August 25, 1895, *Blankinship;* FIG. 4, a fruiting head, × 2, from material cultivated by Gray in the Harvard Botanic Garden, October, 1865; FIG. 5, an achene, × 10, from the latter.

Var. OCCIDENTALIS Gray. Clearly stoloniferous; leaves larger and blunter; peduncles mostly naked; phyllaries more pointed. —Syn. Fl. i^2. 166 (1884). *B. occidentalis* (Gray) Howell, Fl. Nw. Am. i. 305 (1897).—Bottomlands, Union County, Oregon.

When better known, var. *occidentalis* may prove to be a distinct species. Howell in elevating it to specific rank added no new characters and gave no reason for separating it.

Var. **recognita** Fernald & Griscom, var. nov. (TAB. 646), foliis caulinis valde evolutis oblanceolatis vel lanceolatis; corymbis ad 4 dm. latis foliosis; phyllaribus anguste oblongis 0.5–1.3 mm. latis; disco 0.7–1.5 cm. latis; ligulis 1–1.8 cm. longis.—*B. asteroides* sensu Am. auth., non (L.) L'Hér.—Michigan to Manitoba and North Dakota, south to Kentucky, Missouri and Kansas; naturalized in New England and New Jersey. TYPE: Fort Snelling, Minnesota, August 20, 1891, *E. A. Mearns* (Herb. Gray).

Boltonia latisquama, var. *recognita* is the tall plant of woods and prairies, with broad corymbs of large heads, which has been

passing erroneously as *B. asteroides.* It seems, phylogenetically, to be the main variety of *B. latisquama*, of which typical *B. latisquama* is an extreme development in the drier prairies and plains. Var. *decurrens* seems to differ from the wide-ranging var. *recognita* only in its decurrent leaves, while var. *microcephala* is a small-headed extreme somewhat approaching *B. diffusa*, var. *interior* and perhaps mixing with it.

In PLATE 646, FIGS. 1 and 2 are portions of the TYPE of var. *recognita*, × 1; FIG. 3, a head, × 2, from the TYPE.

Var. **decurrens** (Torr. & Gray) Fernald & Griscom, comb. nov. *B. glastifolia* β. ? *decurrens* Torr. & Gray, Fl. N. Am. ii². 188 (1842). *B. decurrens* (Torr. & Gray) Wood, Bot. and Florist, 166 (1870). *B. asteroides*, var. *decurrens* (Torr. & Gray) Engelm. in Gray, Syn. Fl. i². 166 (1884).—Bottomlands of Illinois and Missouri.

Var. **microcephala** Fernald & Griscom, var. nov. (TAB. 646), var. recognitae simillima; foliis primariis oblongis vel oblanceolatis 0.6–1.5 dm. longis; pedunculis 0.5–2.5 cm. longis; phyllaribus lineari-subulatis vel -lanceolatis 0.3–0.4 mm. latis; ligulis 5–8 mm. longis albidis; disco 5–8 mm. lato; achaeniis 1.5–2 mm. longis; aristis ca. 1 mm. longis.—Wisconsin, Illinois, Minnesota and Iowa. WISCONSIN: St. Croix Falls, August 1, 1900, *C. F. Baker.* ILLINOIS: along Illinois Central Railroad, south of Harvey, Cook County, August 30, 1893, *S. H. Burnham* (TYPE in Herb. Gray); wet bottoms, Urbana, *Gleason*, no. 1961; low wet soil near Creek, Vienna, August 9, 1902, *Gleason*, no. 2741; Fox Bottom, near Mud River, August 18, 1914, *Robert Ridgway:* MINNESOTA: Lake City, August 15, 1883, *W. H. Manning;* beach, Shakopee Lake, Louriston Township, Chippewa County, August 5, 1930, *Hotchkiss & Jones*, no. 362. IOWA: wet places, Johnson County, August, 1895, *T. J. Fitzpatrick.*

In PLATE 646, FIG. 4 is a group of mature heads, × 2, from the TYPE of var. *microcephala;* FIG. 5, an expanded head, × 2, from TYPE; FIG. 6, an achene, × 10, from TYPE.

ASTER GRANDIFLORUS L. Our northernmost station is in KING WILLIAM COUNTY: argillaceous roadside thicket northwest of King William Courthouse, no. 11,630.

*A. TATARICUS L. f. CHARLES CITY COUNTY: escaped to dry roadside thicket, Holdcroft, no. 11,631.

*A. UMBELLATUS Mill., var. **brevisquamus,** var. nov. (TAB. 647, FIGS. 1–4), caulibus ad 1.4 dm. altis; foliis lanceolato-ellipticis vel anguste ovatis glabris; involucris 2.5–4 mm. altis, phyllaribus 4–5-seriatis valde inaequalibus mediis lineari-oblongis obtusis ca. 0.5 mm. latis; ligulis 4–7 mm. longis.—Bogs

and swamps, District of Columbia and eastern Virginia. DISTRICT OF COLUMBIA: swamp, Terra Cotta, September 29, 1897 and September 3, 1915, *Th. Holm.* VIRGINIA: sphagnous springy swales bordering Whiteoak Swamp, west of Elko Station, Henrico County, August 17, 1938, *Fernald & Long,* no. 9192; argillaceous and siliceous boggy depressions, about 3 miles southeast of Petersburg, at head of Poo Run, Prince George County, October 18, 1936, *Fernald, Long & Smart,* no. 6894 (TYPE in Herb. Gray; ISOTYPE in Herb. Phil. Acad.).

Typical *Aster umbellatus* Mill., ranging from Newfoundland to northern Ontario, south to western North Carolina, Ohio, Indiana and Illinois, has the involucre (FIGS. 5–7, all × 4) 4–5 mm. high, of gradually lengthening narrow linear-lanceolate acute or obtuse phyllaries, those of the median series nearly equaling the inner ones. Commonly with lanceolate or lance-oblong leaves, it may have them relatively short and broad (elliptic to lance-ovate). The latter individuals are *A. humilis* Willd., small plants sent to Berlin from Pennsylvania but (as shown by Muhlenberg's material and other eastern Pennsylvania broad-leaved plants) scarcely worth even formal designation, although some authors maintain them as a species or as a variety. The most extreme departure from typical *A. umbellatus* in the series with essentially glabrous but often scabrous leaves and gradually lengthening series of narrow phyllaries is the plant of wet cliffs described as *Doellingeria umbellata,* var. *flexicaulis* House. As an extreme departure from the usually stiffly erect plant it is noteworthy but its involucre is not strikingly different and it seems to me a forma rather than a true geographic variety.[20]

Var. *pubens* Gray, chiefly of the region from Upper Michigan to Saskatchewan, south to Iowa and Nebraska, is harsh with scabrous puberulence but otherwise resembles typical *Aster umbellatus.* Its involucres (FIGS. 8 and 9, both × 4) are inclined (in dried material) to be more turbinate and the relatively few phyllaries are very narrow.

On the Coastal Plain, from Florida to Texas, north to North Carolina and Arkansas, occurs *A. umbellatus,* var. *latifolius* Gray, Syn. Fl. N. Am. i². 197 (1884). Gray, and most later

[20] ASTER UMBELLATUS Mill., forma **flexicaulis** (House), comb. nov. *Doellingeria umbellata* (Mill.) Nees, var. *flexicaulis* House in N. Y. State Mus. Bull. no. 254: 712 (1924).

authors, confused the really definite plant of the South by citing a synonymy of *sensu* names. Gray's differentiation was based solely on breadth of leaf ("leaves from ovate-lanceolate to ovate, comparatively short, less narrowed or sometimes even rounded at base"; with the significant statement: "Extreme forms seem very different from *A. umbellatus*, having leaves even 2 inches wide by 3 in length"). It is thus clear that Gray had a broad-leaved southern plant primarily in mind, but he failed to note the distinctive involucre and consequently included any plants with "ovate-lanceolate leaves" and extended the range north to Pennsylvania and New Jersey. The first synonym was *A. humilis* Willd. Sp. iii. 2038, which, as already noted, is only a low and broad-leaved phase of typical *A. umbellatus*, although Willdenow so little understood his own *A. humilis* as to publish in 1806 in Hort. Berol. t. 67, a beautiful plate of *A. infirmus* Michx. as *A. humilis!* Gray's next synonyms under *A. umbellatus*, var. *latifolius* were *A. amygdalinus* sensu Bertoloni (1847) and *Doellingeria amygdalina* Nees (1833), "chiefly, excl. syn.", which is a misleading reference since the basinym, *Aster amygdalinus* Lam. Encycl. i. 305, no. 24 (1782) was founded (as shown by a photograph sent from Paris) on very characteristic *A. umbellatus* cultivated at Paris. The other synonym given by Gray under *A. umbellatus*, var. *latifolius* was *Diplopappus cornifolius* sensu Lindl. (1835), not *A. cornifolius* Muhl. ex. Willd. (1804). The synonymy given by Gray, consequently, is too vague to stand as the basis of his new var. *latifolius*, and only *A. humilis* could have been the nomenclatural basis for anything, the others being misapplications of older names by later authors. I am, therefore, taking Gray's name for the plant of the southern Coastal Plain which, alone, was so marked by him in preparing the Synoptical Flora; and, since he specially commented on "Extreme forms . . . very different from *A. umbellatus*, having leaves even 2 inches wide by 3 in length", I am designating as TYPE of var. *latifolius* the specimen he thus signified. This was collected by *Hale* in Louisiana in 1844. Photographs of portions of it, × 1, are shown in PLATE 648, with the characteristic long involucres (5–7 mm. high), with phyllaries 0.8–1.5 mm. broad of it and other specimens shown, × 4. That

Photo. H. G. Fernald.

Boltonia latisquama, var. recognita: figs. 1 and 2, portions of type, × 1; fig. 3, head, × 2.

Var. microcephala: fig. 4, group of mature heads, × 2; fig. 5, expanded head, × 2; fig. 6, mature achene, × 10.

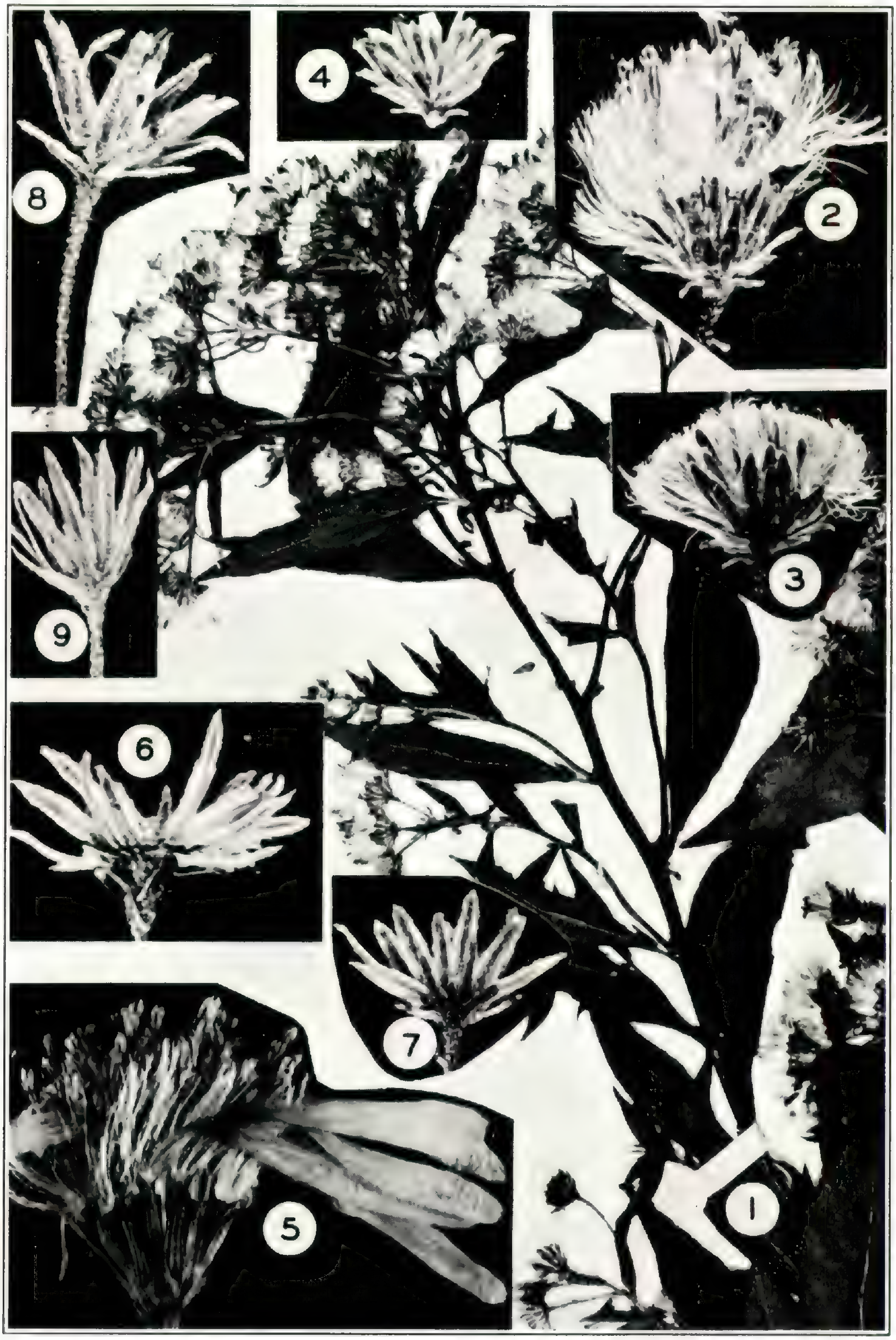

Photo. H. G. Fernald.

Aster umbellatus: figs. 5–7, head and involucres, × 4.
Var. brevisquamus: fig. 1, portion of type, × 1; figs. 2–4, heads and involucre, × 4.
Var. pubens: figs. 8 and 9, involucres, × 4.

A. umbellatus, var. *latifolius*, as thus cleared of its encumberances, is a very distinct variety of the South will be apparent.

In PLATE 647, FIG. 1 is a portion of the TYPE, × 1, of *Aster umbellatus*, var. *brevisquamus;* FIG. 2, a head, to show involucre, × 4, from the TYPE; FIG. 3, head, × 4, from Elko Station, Virginia, *Fernald & Long*, no. 9192; FIG. 4, involucre, × 4, from Terra Cotta, District of Columbia, *Holm*. FIG. 5 is a head, × 4, of typical *A. umbellatus* from Ithaca, New York, *C. C. Thomas*, no. 5226; FIG. 6, involucre, × 4, from Randolph, New Hampshire, *A. H. Moore*, no. 348; FIG. 7, involucre, × 4, from Kennebunkport, Maine, September, 1894, *Grace Gilbert*. FIG. 8 is an involucre, × 4, of var. *pubens*, from the TYPE, Saskatchewan, *Bourgeau;* FIG. 9, involucre, × 4, from Madison, Wisconsin, August 30, 1893, *Churchill*.

In PLATE 648, FIGS. 1 and 2 are portions of the TYPE, × 1, of *A. umbellatus*, var. *latifolius;* FIG. 3, involucre, × 4, from TYPE; FIG. 4, involucre, × 4, from Alabama, *Gates;* FIG. 5, involucre, × 4, from Gateswood, Alabama, *Tracy*, no. 8587; FIG. 6, involucre, × 4, from Georgia, September 30, 1903, *Mrs. Taylor*.

ERIGERON VERNUS (L.) T. & G. Local range extended inland to GREENSVILLE COUNTY: peaty swale by Southern Railway northeast of Emporia, no. 10,441. See p. 360.

E. BONARIENSIS L. To the single station in Norfolk County already reported add from PRINCESS ANNE COUNTY: borders of low woods and clearings along Back Bay, Long Island, no. 11,188; open sandy flats about the Wild Fowl Refuge, near Little Island Life Saving Station, no. 11,189; clearing near old house, Cedar Island, no. 12,489. See p. 389.

*PLUCHEA PURPURASCENS (Sw.) DC. PRINCESS ANNE COUNTY: brackish to fresh marsh along Back Bay, at eastern margin of Long Island, no. 11,190; moist sandy shore, Ragged Island, no. 12,490. See p. 389.

A tropical American species heretofore recorded northward only to the coast of Georgia. The Long Island plant is extreme, with lanceolate leaves cinereous-pilose beneath, the involucre heavily pubescent, its outer phyllaries ovate. Some other collections, from near Hampton, and from tidal shores of the Chickahominy, have narrow leaves but the larger heads and oblong or elliptical outer phyllaries of the common northern *P. marilandica* (Michx.) Cass. Further observation may show that the latter usually broad-leaved and smoother plant may have to be treated as an essentially northern variety of the former. Until I have more field-experience with them in the transition-belt I am not ready so to treat them.

TETRAGONOTHECA HELIANTHOIDES L. To the station in Gloucester County add two in SOUTHAMPTON COUNTY: border of sandy woods southwest of Applewhite's Church, no. 10,447; rich sandy

and loamy woods along Three Creek, northwest of Carey Bridge, no. 10,448. See pp. 356 and 362 and MAP 1.

*RUDBECKIA HELIOPSIDIS T. & G. PRINCE GEORGE COUNTY: borders of dry pine and oak woods 2–3 miles north of Disputanta, nos. 10,837, 11,196 and 11,468.

Very extensive station, the first known outside eastern Alabama and western Georgia. See pp. 375 and 382 and MAP 10.

*R. HELIOPSIDIS T. & G., forma **villipes,** f. nov., petiolis imis villosis.—Prince George County, VIRGINIA: border of dry pine and oak woods 2–3 miles north of Disputanta, July 24, 1939, *Fernald & Long*, no. 10,838, August 17, 1939, no. 11,197 (TYPE in Herb. Gray., ISOTYPE in Herb. Phil. Acad.).

Most of the plants in the large colony belong to *Rudbeckia Heliopsidis* α. of Torrey & Gray, "almost glabrous", originally from Columbus, Georgia. Forma *villipes* is relatively scarce. It was described from Cherokee County, Alabama, by Torrey & Gray as var. β., "stem stouter, pubescent below with spreading, above with appressed hairs." In Prince George County it is at best a minor form.

COREOPSIS ONISCICARPA Fern. The greatest area in Virginia of this species is in southwestern NANSEMOND COUNTY.

There in sphagnous swales and springy, peaty slopes it is often 9 dm. high, single plants bearing 30–60 heads. See p. 399.

Dr. Sherff, in Field Mus. Nat. Hist. Bot. Ser. xvii. 609 (1939), states that "A careful comparison of each specimen [of *C. oniscicarpa* lent him from the Gray Herbarium] with Floridan and other specimens of *C. Linifolia* [capitalization Sherff's] Nutt. showed no constant differences in foliar or capitular characters to warrant separating *C. Oniscicarpa* [capitalization Sherff's] even varietally from *C. Linifolia*." The involucre with lanceolate outer phyllaries and a series of achenes of *C. oniscicarpa* were shown, from photographs, in RHODORA, xl. pl. 534, figs. 1 and 8, the habit of the plant, × ½, in plate 533.

Coreopsis linifolia Nutt. Journ. Acad. Phila. vii. 75 (1834) was one of several species described "*from the dried specimens in the herbarium of the Academy of Natural Sciences in Philadelphia.*" It came from Alabama; and since other Alabama specimens cited in the same paper were collected by Dr. Gates (*Liatris pauciflosculosa* and *L. squamosa*) it is reasonable to

take the series of Alabama sheets from Gates labeled by Nuttall as his own *C. linifolia* and preserved at the Philadelphia Academy as the TYPE series. Other Nuttall types described *"from the dried specimens in the herbarium of the Academy"* are there preserved and it is not probable that the Philadelphia Academy would have transferred them to the British Museum. Sherff, in Field Mus. Nat. Hist. Bot. Ser. xi. 436 (1936), gave for *C. linifolia* "Type specimen: Collected in Alabama (Brit.?)," the queried "Brit." standing for British Museum. On the seemingly safe assumption that the TYPE series is the one at Philadelphia labeled by Nuttall, but with similar specimens of the Gates material also in the Gray Herbarium and in the herbarium of the New York Botanical Garden, I am showing details of the TYPE series, as represented by the Gates specimen in the Gray Herbarium. Since Sherff cites none of the Gates material (except through his note on *C. callosa*), I have felt it justifiable to include some details from other specimens actually cited by him as *C. linifolia.*

In PLATE 649, FIG. 1 is an ISOTYPE (*Gates*), × ½, of *C. linifolia,* labeled by Sherff; FIG. 2, a flowering head, × 2, from the ISOTYPE, showing the broad and blunt outer and inner phyllaries, these conspicuously white-margined; FIG. 3, two plants, × ½, from Gateswood, Alabama, *Tracy,* no. 8565, labeled and cited by Sherff as *C. linifolia;* FIGS. 4, 5 and 6, achenes × 10, from tidal marshes on Biloxi Bayou, Mississippi, September 16, 1885, *John Donnell Smith* (labeled and cited by Sherff as *C. linifolia*).

In *C. linifolia* the relatively large involucre has the ovate white-margined outer phyllaries, to use Sherff's phrase, "ovatae . . . lateribus scariosae, apice subacutae vel rotundatae". The much smaller involucre of the more northern *C. oniscicarpa* (shown, also × 2, in RHODORA, xl. pl. 534, fig. 1) has the outer phyllaries lanceolate, the inner more oblong and not conspicuously white-margined. In the more southern *C. linifolia* the bodies of the achenes are 2.5–3.2 mm. long and 1–1.2 mm. broad; in *C. oniscicarpa* the bodies of the achenes are 1.8–2.2 mm. long and 0.6–0.9 mm. broad. These details of *C. linifolia,* shown in PLATE 649, and the photographic illustrations of *C. oniscicarpa,* already referred to, clearly speak for themselves.

The photographic reproductions of other species, in *Coreopsis* and *Bidens,* all reduced by Sherff in the above cited paper, also speak with complete definiteness.

*Bidens polylepis Blake. Charles City County: clearing in woods and roadside gutter, southeast of Sturgeon Point School, no. 11,203.

Sherff cites no coastwise material from south of Maryland.

*B. coronata (L.) Britton, var. typica Fernald in Rhodora, xl. 349, pl. 506, figs. 4 and 5 (1938). King William County: fresh tidal shore of Mattaponi River, Horse Landing, near King William Courthouse, no. 11,637; similar habitat, northwest of King William, no. 11,638. King and Queen County: similar habitat, Walkerton, no. 11,639. See p. 402.

First from south of lower Delaware; leaves simple to compound; awns of achenes very broad.

*Gaillardia pulchella Foug. Greensville County: sandy roadside south of Emporia, no. 11,205. Henrico County: waste ground and railroad ballast, Richmond, no. 2498. Spread from original cultivation.

*Lapsana communis L. Southampton County: cinders of freight siding, Branchville, no. 10,454. Henrico County: waste ground, Richmond, no. 12,206; embankments and cinders of Chesapeake and Ohio Railroad west of Elko Station, no. 12,207.

Serinia oppositifolia (Raf.) Ktze. Add a station in Greensville County: fallow clay field west of Vincent School, no. 10,455. Also in Southampton County: sandy roadside ditch, southeast of Windman's Mill, no. 12,208.

*Lactuca canadensis L., var. longifolia (Michx.) Farwell. Greensville County: clearing on wooded bottomland of Fontaine Creek, southeast of Taylor's Millpond, no. 10,850.

One of the more northern varieties, not represented in the Gray Herbarium from Atlantic States south of New York and singularly out of place with *Taxodium*, *Crataegus Marshallii*, *Sagittaria Weatherbiana*, *Spiranthes cernua* var. *odorata* and *Amsonia Tabernaemontana*. See p. 368.

*L. floridana (L.) Gaertn., forma **leucantha,** f. nov., corollis albidis.—Sussex County, Virginia: wooded bottomland, Jones Hole Swamp, west of Coddyshore, September 17, 1939, *Fernald & Long*, no. 11,484 (type in Herb. Gray; isotype in Herb. Phil. Acad.).

Prenanthes altissima L. Local range extended southward into Southampton County: rich marly woods along Three Creek, northwest of Carey Bridge, no. 11,486. See p. 363.

(*To be continued*)

Photo. H. G. Fernald.

Aster umbellatus, var. latifolius: figs. 1 and 2, portions of type, × 1; figs. 3–6, involucres, × 4.

Photo. H. G. Fernald.

Coreopsis linifolia: fig. 1, isotype, × ½; fig. 2, head, × 2, from isotype; fig. 3, portions of two plants (perhaps topotypes), × ½, from Alabama; figs. 4–6, achenes, × 10.

INTERESTING PLANTS OF OKLAHOMA

U. T. Waterfall

In the course of making collections in various parts of the state I have collected several plants which, either because they represent additions to the flora or have seldom been recorded, are of interest.

Aegilops cylindrica Host. I found a number of patches of this introduced grass in and around Oklahoma City during the spring of 1939.

In H. I. Featherly's *Grasses of Oklahoma*[1] it is listed as having been first collected from *Payne County* by Professor Robert Stratton of Oklahoma A. & M. College. Undoubtedly it is spreading rapidly in the state.

Iresine rhizomatosa Standley. The Oklahoma specimens that have been passing as *Iresine celosia,* or *I. paniculata,* should be referred to *I. rhizomatosa.*

The latter is the only species found in this region and, as its name indicates, has horizontal rootstocks running near the surface of the ground. The species to which it has formerly been referred is an annual,[2] but our plant is always a perennial.

Portulaca parvula A. Gray. Our specimens have been previously identified as *P. pilosa* which, according to Rydberg,[3] is tropical only.

Gray undoubtedly knew *P. pilosa* and intended his species to be distinct, but the two have been sadly confused since his time.

Ranunculus laxicaulis (T. & G.) Darby. Damp sandy clay, open woods, two miles southwest of Smithville, *McCurtain County,* No. 685. Collected in spring of 1937.

This is the filiform-stemmed *Ranunculus* that has been erroneously identified in the past as *Ranunculus oblongifolius.*[4] The only other record from Oklahoma of which I know is E. J. Palmer's no. 39,348 determined as *R. oblongifolius* Ell.

Ranunculus longirostris Godr. Growing in water, Yashaw Creek, 3½ miles south of Broken Bow, McCurtain County, No. 668. Collected in the spring of 1937.

[1] H. I. Featherly. Grasses of Oklahoma, Tech. Bull. No. 3, Okla. A. & M. College. Stillwater, Okla. (1938).

[2] J. K. Small, *Manual of Southeastern Flora* p. 477.

[3] P. A. Rydberg, *Flora of Prairies and Plains of Central North America* p. 314.

[4] M. L. Fernald in Rhodora 41: 541 (1939).

This identification was qualified by the word "probably" by Miss Bernice Schubert of the Gray Herbarium, as the material was not in the best condition for identification. It is a white-flowered *Ranunculus* with floating stems and filiformly dissected leaves.

OENOTHERA GREGGII Gray, var. TYPICA Munz. Found in sandy clay soil on sandstone hillside, prairie, 3 miles south and 7 miles west of Clinton, *Custer County,* No. 1633, identified by P. A. Munz.

Most of the annual vegetation had already died by the time (August 12) this was collected. Growing nearby were such woody-rooted plants as *Oenothera missouriensis* Sims var. *incana* Gray and *Scutellaria resinosa* Torr. with an occasional rather dwarfed specimen of *Bumelia lanuginosa* (Michx.) Pers. I at first thought this to be new to the state as Munz[1] does not list it from Oklahoma.

An examination of the material at the herbarium of the University of Oklahoma shows another specimen collected since Munz's publication. Therefore this collection constitutes an extension of range within the state.

GAURA FILIFORMIS Small, var. TYPICA Munz. Growing in moist sand, waste field, 3 miles west of Luther, *Oklahoma County,* No. 1677. Identified by P. A. Munz.

Previously it has not been collected northwest of Arkansas and eastern Texas. My nos. 1779 and 1806, taken about three weeks later from approximately the same locality, match the above except that they are more mature and dry weather had caused many of the leaves to fall.

GAURA PARVIFLORA Dougl., var. TYPICA Munz, forma GLABRA Munz. Sandy clay soil, prairie, 3½ miles west and 2½ north of Oklahoma City, *Oklahoma County,* No. 1346. Identified by P. A. Munz.

Of several collections in this vicinity I have found only the one with glabrous hypanthium.

AMBROSIA APTERA IN OKLAHOMA.

While trying to identify certain specimens of the plant that we have been calling *A. trifida* great difficulty has been encountered.

[1] P. A. Munz in Am. Journ. Bot. **16**: 709 (1929).

Some of our Sooner State[1] specimens have the stems and pistillate involucres strikingly black-striate and all of them are more or less so.

Rydberg uses this character in his key[2] to set off *A. trifida* from his *A. striata* and *A. variabilis*, but descriptions of *A. aptera* DC. do not mention it. Our specimens all keyed to *A. striata* but because we were outside of its range as given by Rydberg I became dubious as to the identity of our plants.

Accordingly, with the kind cooperation of Dr. H. A. Gleason of the New York Botanical Garden, we obtained on loan the type specimens of Rydberg's *A. striata* and *A. variabilis*, together with abundant material of *A. trifida* and *A. aptera*.

It became immediately clear that our specimens were not referable to *A. striata* as the fruit of this species is narrow, being about three times as long as broad. Otherwise they are similar. Our specimens and those of the borrowed material of *A. trifida* and *A. aptera* all have fruit about twice as long as broad.

The specimens of typical *A. trifida* have no black-striate markings on the stems or pistillate involucres and usually have a softer, wider-spreading pubescence than *A. aptera*.

The latter species has stems and pistillate involucres that are more or less black-striate, and usually has a harsher, rather scabrous pubescence.

All our Oklahoma specimens of *Ambrosia* should therefore be referred to *A. aptera* which, as I see it, can be separated from *A. trifida* only as indicated above.

It is probable that a critical study of *A. aptera*, *A. striata*, and *A. variabilis* as they occur throughout North America will reveal the fact that they should all be reduced to varieties of *A. trifida* but I am unable to make such a study due to insufficient out-of-state material.[3]

Tragopogon pratensis L. Clay soil, Fairgrounds, Oklahoma City, *Oklahoma County*, No. 909. Several specimens were found in an open area about a block wide and two blocks long on the

[1] Oklahoma is called the "Sooner State" because many people began the run on April 18, 1889, before noon which was the official starting time, and thus got to the lands to be occupied by settlers sooner than those who waited ethically until noon.

[2] Rydberg, *Fl.* of *Pr.* and *Pl.*, p. 764, and in *Fl. N. Am.* xxxiii. pt. 1: 15–22 (1922).

[3] In my own work I am treating *Ambrosia aptera* as *A. trifida*, var. *texana* Scheele in Linnaea, xxii. 156 (1849) = *A. trifida*, var. *aptera* (DC.) Ktze., Rev. Gen. i. 305 (1891).—M. L. F.

southwest corner of the fairgrounds in the spring of 1939. Probably it has been recently introduced.

For aid in the preparation of the above notes I am deeply grateful to Professor Milton Hopkins.

University of Oklahoma
Norman, Oklahoma

Rehder's Manual—Every student of our flora, whether a technical botanist, an amateur or a horticulturist, has awaited with keen anticipation the second edition of Rehder's Manual.[1] The thousands of questions which have arisen since the first edition have been carefully weighed and the newly proposed species, varieties, forms and horticultural products evaluated. To the horticulturist the work will be invaluable; to the botanist indispensable. The varieties and forms of botanists are properly so designated but, to save space and not to oppose too strongly the horticulturist's love of trinomials, the abbreviations "var." and "f." are omitted before the varietal or formal names but entered after the publishing author. Thus, under *Betula papyrifera* Marsh. we get **"B. p. cordifòlia** (Reg.) Fern., var.", **"B. p. mínor** (Tuckerm.) Wats. & Coult., var.", etc., while the commonly cultivated cut-leaved Birch appears as **"B. péndula dalecárlica** (L.) Schneid., f.", this being a forma, not a geographic variety. The bibliographic detail has been very carefully worked out and there is hope that in the not distant future we may have this great mass of essential bibliographic matter for ready reference. Without it the user who wants to check the original publications is largely helpless. This need of the bibliography is, naturally, one experienced only by the technical worker. It is greatly to be hoped that Professor Rehder will be able to supplement the present great work by the bibliographic explanation of it. The book, compact, with no padding, and directly to the point, contains abundant keys and telling descriptions and shows every evidence of being up-to-date, even to the inclusion of new varieties and forms published within the last half-year. Every active student of the flora of temperate North America needs it.—M. L. F.

[1] Alfred Rehder. Manual of Cultivated Trees and Shrubs Hardy in North America exclusive of the subtropical and warmer temperate Regions. Second Edition. xxx + 996 pp. New York. The Macmillan Company. 1940. $10.50.

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THE NEW ENGLAND BOTANICAL CLUB

Vol. 42. December, 1940. No. 504.

A CENTURY OF ADDITIONS TO THE FLORA OF VIRGINIA

M. L. Fernald

(*Continued from page 498*)

Part III. Phytogeographic Considerations

In 1937 I published[21] a brief analysis of the diverse geographic affinities of the flora of the Coastal Plain of Virginia. At that time I suggested seven primary types of relationship there displayed; these should perhaps be reduced to six. The main groupings, however, seem to hold. During the succeeding years considerable additions have been made to most of the groups; and during the five trips from June to October, 1939 (excluding obviously introduced weeds), we were able to extend into Virginia a great number of ranges: 11 plants of the upland (chiefly Blue Ridge, Appalachian Valley and Alleghenies) new to the Coastal Plain; 20 heretofore unrecorded from north of North Carolina; 9 unknown north of South Carolina; 6 unknown north of Georgia; and 1 heretofore known only in Alabama. Giving us a station or stations to fill in the previous broad gap between North Carolina and isolated areas in Delaware, Maryland or New Jersey are 6 species; while 2 supply an intermediate area between South Carolina and the North, and 4 species were found which had heretofore been known only from the Mississippi Basin or the Gulf States. New southern limits were established for 14 species: 13 the first from south of New Jersey, Delaware,

[21] Rhodora, xxxix. 465–489 (1937).

Maryland or the Potomac near Alexandria, 1 the first from south of southern New England. The Asiatic *Aneilema Keisak* is new to the American flora. *Desmodium glabellum* has apparently been unknown since its original collection in the 18th century in South Carolina. One species, erroneously identified, drops from the Virginia list; and 22 plants new to science, 7 of them endemic in Virginia, were discovered or worked out from earlier collections. Still others await fuller study.

It is needless here to discuss in detail most of the geographic relationships of these plants. They fit, for the most part, into the groupings already discussed. It is gratifying, however, to see regular increase in the group of species which apparently radiated out from the Appalachian Upland as it became elevated from its coastal plain status of Cretaceous time; and to see the gradual reduction in number of the species isolated from North or South Carolina in Delaware or New Jersey. One group of species, those of the fresh or but slightly brackish tidal shores and marshes has not previously been considered in this series of papers. It may, therefore, be specially discussed.

The Flora of Fresh Tidal Estuaries and Shores.—The peculiarity of the fresh or barely brackish tidal estuary[22] is the regular action of tide, alternately flooding and leaving bare the inner shores of streams and inlets twice a day with essentially fresh water. The plants which can tolerate such daily changes are a limited number. Besides the regular and somewhat indifferent species of reed-marsh they consist of a remarkable group of species of a few paludal genera, the species or the genera usually exhibiting as a regular feature of their geographic distribution extreme localization. Although a few plants found in our more brackish estuaries, like *Spartina cynosuroides* and *Scirpus robustus*, tolerate considerable salinity and usually follow the outer coast, the more typical estuarine species are intolerant of much salinity in the waters and confine themselves to the fresh to but slightly brackish reaches of streams, pools and inlets. This group is, then, of peculiar interest, since the plants have apparently mostly attained their present habitats and extreme isolation in the past, at periods when they could

[22] See Fassett, N. C.: *The Vegetation of the Estuaries of Northeastern North America.* Proc. Bost. Soc. Nat. Hist. xxxix. no. 3 (1928).

migrate from river to river along fresh or brackish (not strongly saline) shores.

Such conditions today prevail in a region like Back Bay in southeastern Virginia, where the off-shore bars and continuous dunes of the outer shore shut in a shallow body of tidal waters, perpetually renewed by fresh streams or seepage, and with the nearest inlet from the open sea far below the Virginia-North Carolina line. Rarely, during wild storms, sea-water dashes from the outside Atlantic into sheltered Back Bay; and sufficient salinity has been preserved in some of the marshes to maintain a few specially tolerant halophytes. The shores of Back Bay and the fresh pools and ponds on its margins or on Long Island are, however, the homes of such notable plants of the fresher marshes and waters as *Cyperus haspan* var. *americanus* (MAP 9), the American representative of a pantropical species (tropical and warm-temperate North and South America, Africa and warmer regions of Asia and Australia). The world-range of the species is suggestive of that of *Cyperus brevifolius* (MAP 21). Other typical plants of the freshish marshes of Back Bay are endemics of the two Americas; such, for instance, as *Typha truxillensis* (MAP 8), with details of distribution somewhat different from those of the two species of *Cyperus* and an ability, through its coma of perianth-bristles, to spread, locally, away from the slightly brackish marshes (where it rarely persists). Others are endemics of the southeastern United States. A good example is *Juncus megacephalus* (MAP 5), a very distinct species which occurs in the fresh to brackish marshes from Texas to the shores of Back Bay. Its habitats, as given on such labels as clearly indicate them, are as follows: ditch (La.), wet sandy shores (Fla.), mucky ground (Fla.), flatwood ponds (Fla.), prairie (Fla.), pineland (Fla.), low pinelands (Fla.), moist pine barrens (Ga.), low ground back of sand-dunes (Ga.), lime-sinks (Ga.), savannah (S. C.), dune-hollows (S. C.), river-marsh (S. C.), salt meadow (N. C.), marsh (N. C.), dune-hollow (Va.), swale back of dunes (Va.), inner border of brackish to fresh marsh (Va.). In brief, *Juncus megacephalus*, like its associates, is not a pronounced halophyte; we do not find it, like *J. Roemerianus*, for instance, following the salt marshes. It is not a plant of the saline outer coast but rather of the fresh to barely brackish inner

margin of the coast, sometimes in fresh inland habitats. With great stretches of fresh to slightly brackish inner shore, now extending from below Cape Henry to Cape Fear and, formerly, doubtless more continuously to Florida, it has been able to follow more or less without interruption its most favorable habitats; but it does not follow north along the saline outer coast.

Not all the American plants of Back Bay shores have so continuous a range on the inner coast as do *Cyperus haspan* var. *americanus* and *Juncus megacephalus*. As pointed out on p. 371, the remarkable little genus *Lilaeopsis* (formerly called *Crantzia*) is a living relic of a very ancient dispersal (MAP 7), with its species variously scattered in New Zealand, southeastern Australia, Tasmania, temperate and subtropical South America, the Andes, Mexico and southern Arizona, and Pacific and Atlantic temperate North America. Apparently this disruption of the genus is the result of breaking down of old connections, with Eurasia and Africa omitted. It is difficult not to consider it a remnant of an old spread northward from ancient Antarctica. A frequent species of the Atlantic margin of North America is *L. chinensis* (name reflecting a geographic misconception by Linnaeus), with dispersal in fresh to brackish estuaries from Florida to western Nova Scotia. It is in many estuaries of Virginia. The specialty of Back Bay, however, is a much larger species with matted creeping and floating stems, *L. carolinensis* (MAP 6). On the southeastern side of Long Island in Back Bay a small pond at the head of fresh marsh is filled by this species, a very distinct member of the genus, with its chief center on the lower reaches of La Plata River in temperate eastern South America, but with four remote stations known in North America: near New Orleans; shallow water near Myrtle Beach, South Carolina; an unidentified station (presumably near Wilmington), North Carolina; and this pond on Long Island. *Lilaeopsis carolinensis* doubtless occurs in other shallow waters along or near the inner coast, back of the outer rim of sand dunes, but its two areas, one in latitudes 30°–36° 35′ north, the other between latitudes 25° and 35° south, were presumably derived from a former more continuous large area. In this connection the range of *Triglochin striata* (map 19), with a subantarctic dispersal, on Chatham Island and in New Zealand, Australia,

South Africa, temperate South America and warm-temperate North America (in eastern South America found between lat. 22° and 40° south, in eastern North America between lat. 22° and 38° north), comes to mind, for *Triglochin striata* is known in Virginia only from the tidal marshes of Back Bay. It here accompanies *Ammannia Koehnei* (MAP 4). This is one of the most localized of estuarine plants. Discovered prior to 1840 on the marshes of Hackensack River in northern New Jersey, the species is now known on the estuary of York River and on Back Bay (an endemic variety on one river-estuary), with two known stations (doubtless many more) on the off-shore bar of North Carolina, the other known stations in Florida and locally along the Gulf of Mexico. Like so many estuarine species its range is interrupted. It is, therefore, significant that it belongs to another genus of somewhat general pantropical and warm-temperate range. As stated by Koehne in his treatment of the *Lythraceae* (in Engler's *Pflanzenreich*), *Ammannia* has 20 species, occurring in Australia, the Malayan region, Polynesia, southeastern and southern Asia (extending thence into southeastern Europe and the Mediterranean), Africa, subantarctic Sandwich Islands, South America and the warmer regions of North America. *Ammania* is not a holarctic genus. Like so many others which stretch northward into warm-temperate North America the genus today is primarily tropical and it also shows an austral disruption suggesting an old Antarctic dispersal.

In brief, the species which characterize the fresh to but slightly brackish shores and pools about Back Bay are largely plants of highly restricted and localized occurrence, and they belong for the most part to genera or species with the characteristically severed geographic occurrence of all pantropical and subantarctic groups. Their primary dispersal, considering the fact that they are incapable of succeeding in highly saline habitats, such as prevail on most coasts, has been a phenomenon of the past. Only on landlocked coastal shores can it now go on, except when the plants are transported by man or by the rarest of natural agencies. Of course, when a plant like "Wild Celery", *Vallisneria americana,* intentionally transplanted as a food for waterfowl, is placed in so favorable a habitat as Back

Bay it will prosper. But the plants which give significance to the flora of the region, *Cyperus haspan* var. *americanus*, *Juncus megacephalus*, *Lilaeopsis carolinensis*, *Triglochin striata* and *Ammannia Koehnei*, are largely unnoticed by those who look upon conservation of the wild life of such an area primarily as the attraction and maintenance of waterfowl. There is no probability that the typical estuarine species have been recently introduced by man.

The peculiarly significant indigenous plants of the fresh to but slightly brackish shores of Back Bay are not alone species of tropical and austral groups. Some plants of boreal dispersal are also isolated there. On the seeping, springy sands bordering Back Bay west of False Cape there is a remarkable turf, occupying the fresh springheads and saturated sands. It consists of a close mat of a few species: *Eleocharis albida* (tropical American, here near its northern limit), *E. halophila* Fern. & Brackett (Newfoundland and Gulf of St. Lawrence southward, here at its isolated southern limit), *E. Lindheimeri* (Clarke) Svenson (northern Mexico and San Bernardino Mountains, with distant stations eastward and northeastward to Texas and Michigan, here remotely isolated) and other local plants Among them is the very definite *Ranunculus hederaceus*, a matted herb of springy ground. *R. hederaceus* occurs in western Europe, and its American stations[23] are remote. By early authors, with no field experience with the plant, it was assumed to be an introduction from Europe. This may sometimes be the case. In Newfoundland[24], however, it occurs with the regular indigenous species of wet sands; and, surely, on the shores back of False Cape, where it forms part of the mat, it seems as indigenous as the endemic American species of *Eleocharis* with which it grows or as the highly localized and endemic *Ludwigia brevipes* (New Jersey and southeastern Virginia) which abounds, along with the subtropical *Bacopa Monnieria*, on the neighboring flat. In the Great Dismal Swamp, likewise, it is not in an area where man would presumably carry it. The significance of *Ranunculus hederaceus* in the problem will later be discussed.

[23] See Drew, W. B.: *The North American Representatives of Ranunculus, § Batrachium*, Rhodora, xxxviii., especially pp. 12–14 (1936).

[24] See Fernald, *Some Relationships of the Floras of the Northern Hemisphere*, Proc. Internat. Congr. Plant Sci. ii., especially p. 1506 (1929).

Back Bay, which today presents ideal conditions for the local spread of species of fresh to brackish shores, is not like the typical fresh river-estuary. The fresh estuaries are found far up-stream from the mouths of the eastern Virginian rivers. Those which have been explored by us are on the James and the Chickahominy and their tributaries, on the Pamunkey, the Mattaponi, and, to a lesser extent, on the Nottoway and the Blackwater. They are highly developed but only slightly explored (and that some years ago) on North Landing River. On the main River James the best of the fresh tidal marshes begin about 50 miles from its mouth and thence extend 25 miles up-river, but the smaller tributary creeks and the Chickahominy have good tidal marshes from near their mouths well up-stream, on the Chickahominy at least to Windsor Shades. The York is salt for more than 30 miles, up to Westpoint, at the confluence of the Pamunkey and the Mattaponi. The fresh tidal marshes on the Mattaponi follow that stream (often with broad tidal-marsh islands) about 30 miles, to the region of Walkerton. On the Pamunkey they are finely developed but we have not determined their extent. The Nottoway and the Blackwater unite at the North Carolina line to form the Chowan in North Carolina, reaching the sea via Albemarle Sound, which itself merges into Pamlico Sound, these sounds mostly cut off from the open Atlantic by a wonderful development of off-shore bars, sometimes 4 miles broad. Tidal conditions extend slightly into Virginia on the Nottoway; on the Blackwater they extend above Franklin. North Landing River, a sluggish tributary of Currituck Sound, thence to the sea through Albemarle and Pamlico Sounds, is bordered nearly its whole length by broad and fresh tidal marshes. Its mouth is more than 60 miles from the first opening to the Atlantic, at Oregon Inlet, on the outer coast of Dare County, North Carolina. The fresh tidal estuaries to which I am referring, are, then, anywhere from 30 miles (York River system) to 125 miles (Blackwater River) from the open Atlantic. They illustrate, very typically, the estuaries of Atlantic North America north to the St. Lawrence. On several or all of the Virginian estuaries examined a few of the species of Back Bay are found: *Sagittaria falcata* Pursh (Guatemala to Delaware and Maryland); *Cyperus haspan* var. *americanus* (MAP 9,

already discussed); *Eleocharis albida* (see p. 508) and *Lippia nodiflora* (tropical America, north to Texas, Oklahoma, southeastern Missouri and southeastern Virginia). The river-marshes, however, have a considerable restricted flora, which we do not know on Back Bay. This includes

ISOËTES SACCHARATA (tidal mud of Delaware, Maryland, District of Columbia, and Potomac waters to Alexandria and vicinity.—*Pfeiffer*, Mon. Isoëtaceae; southeastern Virginia, closely approaching North Carolina. See p. 406).

SAGITTARIA SUBULATA (tidal mud, Alabama and Florida to southeastern Massachusetts).

ZIZANIOPSIS MILIACEA (Tropical America, north to Maryland and southeastern Missouri).

ECHINOCHLOA PUNGENS, var. COARCTATA Fern. & Grisc. (tidal marsh, North Landing River, endemic).

CLADIUM JAMAICENSE (tropical America, north to marshes of North Landing River).

CYPERUS BREVIFOLIUS (pantropical, north to Florida and southern Georgia; Chickahominy and Delaware Rivers. See pp. 395 and 419 and MAP 21).

RHYNCHOSPORA MACROSTACHYA var. COLPOPHILA (tidal marshes of Maryland and Virginia).

ERIOCAULON PARKERI (tidal mud, St. Lawrence River; Penobscot River, Maine, to Blackwater River, Virginia. See p. 432 and MAP 17).

ANEILEMA KEISAK (eastern Asia; southeastern Virginia, closely approaching North Carolina. See p. 441 and MAP 20).

CASSIA FASCICULATA var. MACROSPERMA (fresh tidal marshes and shores, southeastern Virginia, endemic. See p. 455 and PLATE 635).

AESCHYNOMENE VIRGINICA (fresh to brackish tidal marshes and shores, southern New Jersey, southeastern Pennsylvania and eastern Maryland to the valley of the James. See RHODORA, xli. 466 and map 1).

HYPERICUM MUTILUM var. LATISEPALUM (Florida to Texas; fresh tidal marshes of Mattaponi River. See pp. 402 and 466).

ELATINE AMERICANA (chiefly on tidal mud, St. Lawrence River and interruptedly to Virginia. See p. 466 and MAP 18).

AMMANNIA KOEHNEI var. EXAURICULATA Fern. (marshes of North Landing River, endemic).

LUDWIGIA ALATA Ell. (tidal marshes, Louisiana to Florida, thence very locally to North Landing River).

ERYNGIUM AQUATICUM (Texas to Florida, north to New Jersey. See pp. 386 and 467).

LILAEOPSIS CHINENSIS (tidal marshes, Florida to Nova Scotia. See pp. 391 and 470).

Bacopa cyclophylla (tidal mud, Florida to Maryland, with apparent gaps of hundreds of miles. See p. 402 and map 22).

B. obovata Fern. (tidal mud, Chickahominy river, very rare. See map 24).

Lobelia elongata Small (tidal marshes, very localized, Georgia to Delaware and Maryland. North Landing River and tributaries).

Boltonia asteroides var. glastifolia (fresh tidal marshes and shores, southern New Jersey to Louisiana. See pp. 396 and 486 and plate 641).

Bidens mitis (Michx.) Sherff (tidal marshes, Louisiana to Florida, thence, very interruptedly, to Maryland. North Landing River).

These 22 plants, which, in Virginia at least, are strictly estuarine, are for the most part members of wide-ranging genera; but, whereas some of the more notable plants of the fresh to brackish shores of Back Bay have relatively continuous ranges northward, though others are with strikingly isolated stations, practically all the truly estuarine plants are highly localized. Two of them perhaps persist as relics from former semi-cosmopolitan ranges. *Cyperus brevifolius* (map 21) has as wide a range as *C. haspan* (see p. 419), occurring rather generally in the warmer parts of Asia (even north to southern Kamtchatka), the Malayan region, islands of the Indian Ocean, eastern Australia, New Zealand, Oceanica, locally in Africa, on islands of the South Atlantic, and from La Plata River in eastern South America northward to Bermuda and southern Georgia, with isolated stations on the Chickahominy and the Delaware and, westward, in Central America, Mexico and southern California. The world-range is definitely of the pantropical order, with the suggestion of radiation out of ancient Antarctica. Those who know the plant in eastern Asia and the Malayan region, however, state that it is there inclined to become a weed. On the Delaware it has not long been recognized and we have only a single station as yet on the Chickahominy. That is below an old ferry-landing, where it is not impossible that the plant started from oriental packing or straw thrown away. It needs further watching before we can surely assert that it is indigenous on the Chickahominy and the Delaware.

The other species of remote geographic relationship is *Aneilema Keisak* (map 20). It is so definitely a part of the regular vege-

tation of river-shores and fresh tidal marshes throughout the area from the Mattaponi to the Blackwater, always with the endemic and highly conservative eastern American estuarine species, that it is most difficult to think of it as a possible introduction. It seems as indigenous as the local *Cassia, Aeschynomene* and *Rhynchospora* with which it associates and as *Phryma, Liriodendron, Carya* and the other woodland genera which occur only in eastern North America and eastern Asia. When MAP 20, showing the range of *Aneilema Keisak,* is compared with MAP 21, giving the range of *Cyperus brevifolius,* one can not fail to recognize that it is like two small segments of MAP 21, with the rest of the world eliminated. It must be noted, however, that the very recent discovery of *Aneilema Keisak* in America at first seems like an argument against its being indigenous. When, however, we consider that such an abundant and very conspicuous plant of drier (therefore more accessible) areas of southeastern Virginia as the gigantic sunflower-like herb, *Silphium compositum* (up to 10 feet high and with leaves often a foot broad) was long overlooked as a Virginian, until within the past decade[25], that the regular estuarine companion of *Aneilema Keisak, Aeschynomene virginica* (up to 8 feet high, with ornamental pea-like flowers), was not known as a living Virginian from the time of its discovery by Clayton two centuries ago until Long and I found it in 1938, or that the very conspicuous and usual companion of these, the abundant endemic large-fruited *Cassia* (up to 6 feet high and with showy orange-yellow flowers) was undetected until 1939, the fact that the Aneilema has only recently been discovered in America becomes a very unimpressive point. Most of the phytogeographically significant plants of tidewater Virginia were unknown there a decade ago. It is most interesting, therefore, that *A. Keisak* occurs exclusively with conservative and endemic American estuarine species in southeastern Virginia and not in rubbish, waste spots, roadsides or man-made ditches. If it is not a native it has assumed a remarkable resemblance to one. It should not be overlooked, on the other hand, that another Asiatic species of *Aneilema* is found on the Coastal Plain from Florida to South Carolina. This is *A. nudiflorum* (L.) Wallich[26] of southern Asia, which

[25] See Fernald, RHODORA, xxxix. 329 (1937).

[26] For statement of nomenclatural situation see Merrill, Journ. Arn. Arb. xviii. 65 (1937).

Small (*Manual*) cites from "Roadsides, woods, and orange-groves, Coastal Plain, Fla. to Ga. Nat. of E. Indies." Not only is *A. nudiflorum* native of the East Indies; Clarke, in his monograph, says "India Orientalis, Malaya, China; ab Himalaya ad Zeylaniam, Borneo, ins. Philippine et Loo-Choo; alt. 0–2000 met., vulgatissima". I do not know its status in Florida and Georgia, except from the statement of Small; but the only Floridan label in the Gray Herbarium with statement of habitat reads "low flat woods", while Neil Hotchkiss, writing of its occurrence on Minim Island, Santee Delta, Georgetown County, South Carolina, said "the plant appeared to be at home along the margin of a marsh"[27]. That suggests the behavior of *A. Keisak* in southeastern Virginia. Both plants must be watched. Tidal marshes are scrupulously avoided by all except the most hardened of botanists; and even though *A. nudiflorum* may be a recent adventive from Asia which is rapidly spreading, *A. Keisak* may prove to be, as its behavior suggests, a conservative and ancient member of our flora.

There is no question that the remaining 20 species which in Virginia are restricted to fresh river-estuaries are indigenous. They include many phytogeographic types: some are tropical American species, like *Cladium jamaicense* ("Saw-grass"), reaching their northern limit on streams entering Currituck Sound, or *Zizaniopsis*, which comes farther north; others, like *Ludwigia alata*, are strictly North American but unknown in Virginia except along North Landing River; others, like *Eryngium aquaticum* or *Lobelia elongata*, are primarily southern but reach New Jersey, Delaware or Maryland; while some, such as *Sagittaria subulata* and *Lilaeopsis chinensis*, are scattered from the southeastern states to southern New England or Nova Scotia. Another series is prevailingly northern. *Eriocaulon Parkeri*, MAP 17 (member of a pantropical group of probably ancient dispersal from Antarctica), is on the fresh tidal mud of the St. Lawrence from above to far below Quebec, on tidal marshes of New England, New York, New Jersey, Delaware, Maryland and Virginia; while *Elatine americana* (MAP 18, excluding reported stations in the interior of the continent) is on the tidal reaches of the St. Lawrence, and on remote tidal muds from

[27] Hotchkiss, RHODORA, xlii. 21 (1940).

Northumberland Strait, New Brunswick, to the James, the known areas often 100 to 200 miles or more apart. Others, like *Isoëtes saccharata* and *Aeschynomene virginica* are chiefly on tidal marshes of the Delaware system and those confluent with Chesapeake Bay; *Rhynchospora macrostachya* var. *colpophila* belongs in the tidal marshes of the Chesapeake area in Maryland and Virginia; *Cassia fasciculata* var. *macrosperma* is endemic in tidal marshes from the Mattaponi to the James; and three others are known only from a single series of tidal marshes each: *Echinochloa pungens* var. *coarctata* and *Ammannia Koehnei* var. *exauriculata* on North Landing River and *Bacopa obovata* Fernald (MAP 24) on the Chickahominy.

If we were to follow northward, investigating the specialized floras of the different fresh tidal estuaries, we should find these conditions repeated: *Bidens bidentoides* on the Hudson, Delaware and Maurice (New Jersey) Rivers; *B. mariana* Blake on Northeast River and the lower Susquehanna in Maryland; *B. Eatoni* (with many localized and recognizable varieties along separate rivers) in the marshes of far-distant rivers from the St. Lawrence to the Hudson; *B. infirma* Fernald endemic on the St. Lawrence; *Micranthemum* (or *Hemianthus*) *micranthemoides* from the lower Hudson to the Potomac; *Cardamine Longii* Fernald (MAP 24) on tidal mud of Cathance River, Maine; *Gentiana Victorinii* Fernald (map 20) and *Cicuta Victorinii* Fernald on the St. Lawrence; and so on with several others. Whether primarily southern and failing to reach north to Virginia, or barely entering the state, or known northward to the Potomac, the Susquehanna or the Delaware; or more northern and known from the James or the Blackwater to the Penobscot or the St. Lawrence, the estuarine flora shows undoubted localization within the narrow ecological limits in which it thrives. Furthermore, specific or varietal endemism is a regular feature of this flora. Restricted endemics, known from no other area, are found in the marshes of more than a dozen rivers from southern Virginia to the St. Lawrence; and from Maine to Virginia they show a marked preference for the smaller rivers and creeks with extensive swales, rather than the larger. In Virginia, so far as we yet know, the endemics of a single (rarely also on an adjacent one) river are on the North Landing River, the Chick-

ahominy and the Mattaponi, not on the James, the Rappahannock and the Potomac. This is evidently due to the much greater development of marsh along the small streams (the larger rivers, like the James, having more open wave-washed and unstable shores) and to their naturally more circumscribed areas (the larger rivers tending to have a more generalized flora).

When we consider the genera to which the species belong it will be seen that they are all wide-ranging or subtropical or tropical groups. The strictly holarctic genera are not represented. This fact, that the estuarine species belong in genera of semi-cosmopolitan, subtropical, tropical or extreme austral occurrence (*Eriocaulon* and *Lilaeopsis,* for instance) is of importance, for we do not get estuarine floras well developed on the more northern areas of eastern North America. The St. Lawrence and the streams entering the Gulf of St. Lawrence are, apparently, the northernmost rivers with well developed estuarine floras, but from there to North Carolina and beyond the estuarine floras become significant to the student of the flora.

I have sufficiently emphasized the extreme isolation of these plants and their very limited tolerance of other conditions than those in which they grow. By some their dispersal, whether they be pantropical types or endemic American species, is satisfactorily explained by saying "the birds did it", just as by a geologist of some renown I am told that the famous isolation of Coastal Plain plants about the head of Lake Michigan is wholly explained by the presence there of a bustling commercial center, Gary, freight-cars and railroad-engines, to his mind, having transported the seed. Not having the imagination to visualize railroad-trains dipping down into the Coastal Plain bogs and pools to secure the seeds of rare species of *Psilocarya* and other highly localized paludal and aquatic conservatives, in order to plant them (many milleniums before Gary was ever thought of) in the bogs and pools of northwestern Indiana, I can hardly be satisfied by so simple an explanation. So, cognizant of the many studies showing that migrating birds fly clean and that they are such expert aviators as not to carry on their long flights adhering chunks of mud to unbalance them, and that they eat most plants as food, not as altruistic spreaders of remote epibiotics, I can accept the superficial and too easy explana-

tion that birds are the chief agents which have brought about the present ranges of many plants, only in case of their very short flights and flutterings from one spot to another in close proximity. If birds have been the primary agents in dispersing our most conservative estuarine species, it seems very strange that we should have so many limited endemics, known only from the shores of single or of few rivers. As has been repeatedly shown, the overworked bird is scarcely to be taken seriously in this problem.

So, likewise with winds. The plants which characterize the estuary-flora are those of wet mud, inundated shores and drowned marshes. They are not plants of dry habitats. If seed-bearing portions get stranded and sufficiently dry to be picked up by wind, this must be a rare exception and not enough to account for the regular occurrence in so many fresh estuaries of the same species. The seeds of estuarine species rarely, if ever, have modifications to favor wind-dispersal.

I have shown how, along such an extensive landlocked area as Back Bay, spread of the shore- and marsh-plants is a simple mechanical process, and that such a species as *Juncus megacephalus*, intolerant of much salinity, occurs back of the off-shore bars, islands and dunes, very regularly from Pamlico Sound to Back Bay. Although its two nearest relatives, *J. scirpoides* and *J. brachycarpus*, plants of stable sands, peats and clays and of more inland occurrence, follow north, in the former case to southern New York, in the latter to the local Tertiary beds of Massachusetts, *J. megacephalus* of fresh to but slightly brackish marsh stops its northern spread abruptly at Back Bay, beyond which the coast becomes open and exposed to the full saline influence of the Atlantic[28]. Right here, I believe, is the explanation of the great isolation in our fresh tidal river-estuaries of the distinctive plants of warm-temperate, subtropical, tropical and subantarctic relationships. These plants are intolerant of the extreme salinity of outer coasts; they thrive in the area between high and low tide where the waters are at most only slightly brackish. They are an extremely conservative and fastidious element in our flora. The wide latitudinal range of this special-

[28] Extensive landlocked bays farther north, like Chincoteague, Sinepuxent and Assawoman Bays, extending from Accomac County, Virginia, to Sussex County, Delaware, may, when properly explored, yield many of these southern species. Who knows?

ized flora along the margin of the northeastern United States and Canada, from southeastern Virginia (some of the species from Florida and the Tropics) to New Jersey, southern New York, the tidal rivers of Maine or even of eastern New Brunswick and, in some cases, the St. Lawrence from Lake St. Peter to below Quebec, calls for a condition comparable with that of Pamlico, Albemarle and Currituck Sounds and Back Bay today. Most geologists are agreed, I believe, that such a condition existed, all the way from Florida to the Gulf of St. Lawrence, when the continental shelf, now submerged off our Atlantic coast, was elevated as a nearly continuous outside ridge. That would make a tremendous southwest to northeast landlocked sound along the borders of which plants of fresh to merely brackish tidal shores could freely travel, just as today they are swashing and spreading on the changeable marshes and shores of Back Bay. The shores need have been no more stable than are those of Back Bay today; the exact stations of the plants need not have been fixed. The quality of the shore, tidal and fresh to brackish, not strongly saline, was the essential to success. To me this seems the obvious explanation. With the depression of the continental shelf the coast, especially northward, lost its outer fringe, the shores were bathed directly by seawater and the long stretches of country between the fresh tidal reaches of the rivers and creeks lost the estuarine flora. It today exists as a relic of the period before the continental shelf became depressed.

In considering when this migration northward along the landlocked sounds which extended to the Gulf of St. Lawrence, took place it is pertinent to quote from the thoughtful study of our coast by Professor Douglas Johnson. From his New England-Acadian Shoreline[29] I quote:

In Georgia and Alabama, exclusive of the Florida projection, that part of the Atlantic coastal plain exposed above sealevel has a breadth of 150 to 175 miles; in the Carolinas and Virginia it narrows to 125 miles or less; in New Jersey it declines from 65 to 25 miles; in Long Island, Marthas Vineyard, and Nantucket it appears as narrow fragments only; and off the coast of Maine is wholly lost to view. At the same time the submerged portion of the coastal plain, forming the continental shelf, which off southern Florida is only a few miles wide,

[29] Johnson, Douglas, The New England-Acadian Shoreline. New York, John Wiley & Sons. 1925. See especially pp. 296–302.

broadens off the Carolinas and Virginia to 50–80 miles, reaches a breadth of 100 miles off northern New Jersey, and where wholly submerged off the coast of Maine has a width of 150 miles or more. The increase is not uniform, however, for the submerged part of the plain is unusually broad opposite the bight where Florida and Georgia meet, and unusually narrow in the Cape Hatteras region. At the southwest the inner lowland, where well developed as in Alabama, is far from the sea. In the Virginia-New Jersey sector it dips under the water in places, is slightly but continuously submerged in Long Island Sound, and deeply so in the Gulf of Maine. Could we have a more striking picture of a single great topographic belt 150–200 miles broad, submerged progressively deeper and deeper toward the northeast, one of its elements after another disappearing from view, until all are completely buried under the ocean?.

. . . .

It will appear from this table [not here included] that the margin of the Atlantic continental shelf (excluding the Bahama banks) is only a few fathoms below sealevel off Florida, is from 25 to 35 fathoms deep off Georgia and the Carolinas, 40 to 48 fathoms opposite Maryland, 48 to 55 off the New Jersey and Long Island coasts, and 60 to 70 fathoms deep at the outer edge of the Banks. There are some local departures from the gradual deepening toward the northeast; but the progressively greater submergence in this direction, indicated so clearly by the progressive drowning of the cuesta and lowland topography and by the narrowing of the exposed coastal plain toward the northeast, is strikingly confirmed by the attitude of the edge of the continental shelf.

. . . .

It would seem that the depth of the Gulf of Maine inner lowland offers us the most reliable measure of the amount of submergence of this coast that we thus far possess. The unreliable character of estimates based on depths of submarine channels, especially when the subaërial origin of those channels is still open to question, has been commented on in another connection. But in the broad inner lowland of a coastal plain, preserving on its floor features characteristic of subaërial denudation operating on coastal plain deposits of unequal resistance, we apparently have a safe basis for calculation. Unless tidal scour has been strongly operative,—and both the form of the bottom and other considerations would seem to dispose of the possibility of effective tidal erosion on the broad open floor of the inner basin,—we have in the maximum depth of the drowned lowland a minimum measure of submergence since the lowland was carved. Several soundings between 180 and 200 fathoms are found along the deep channel at the northern base of the main cuesta. That these particular depths cannot be ascribed to tidal scour is indicated by the fact that the outlet channel farther east, between Georges Bank and Brown Bank, is much shallower. We must rather infer partial filling of the former valleys in cuesta and lowland, due possibly to slumping from the Banks and to material removed from their summits by waves and currents. Streams doubtless flowed from the deep areas in question through the outlet channel to the former sea margin many miles to the southeast; hence the apparent submergence calculated from the

soundings must be increased by an allowance for the fall of the stream. It seems safe to say that since the inner lowland now forming the Gulf of Maine was carved, the land has been submerged to a depth of more than 1200 feet. If the land recently stood several thousand feet higher than now, as some have believed, it must have been for a very short period only; else the inner lowland, drained by a stream trenching comparatively weak coastal plain deposits, would have been graded to a much lower level. Farther to the southwest, as already noted, the submergence was progressively less than in the Gulf of Maine region, although there is evidence that the decrease was irregular, with local areas of increasing submergence,—facts which show that a subsidence of the land rather than a rise of sealevel was primarily responsible for the submergence.

. . . .

The interpretation of the Banks as a coastal plain cuesta receives support from the fact that in the course of their operations on the Banks fishermen bring to the surface fragments of fossiliferous sandstone and limestone. A series of these collected and described by Upham, and determined by Verrill to be of Tertiary age, (probably Miocene or even Pliocene) shows that the submergence must have occurred at the end of the Tertiary or still later in post-Tertiary time; for after the deposition of the late Tertiary sediments we must allow time for the erosion of the lowland prior to its submergence. If the bevelled top of the cuesta is the remnant of a peneplane developed on the coastal plain beds (and perhaps also on the crystallines of the oldland), then since the deposition of the late Tertiary formations the land was uplifted, one cycle of erosion completed, another uplift occurred, and in the new cycle maturity was attained before subsidence drowned the resultant topography. Thus we should expect the subsidence to be at least post-Miocene, and more probably post-Pliocene.

With this picture, so graphically presented by Douglas Johnson, of the northward depression of the Coastal Plain until, from Massachusetts eastward, it was completely submerged (except for the relatively slender and rapidly disintegrating Sable Island at the outer rim, more than 100 miles south of Cape Breton Island), it is easy to see what happened to the flora of fresh to but slightly brackish shores which, as I view the problem, freely spread along the margin of the landlocked sound which, by the final submergence of the Banks Cuesta in "post-Miocene, and more probably post-Pliocene" was finally severed into scattered remnants.

The interpretation that the conservative plants of the estuaries of New York, New England, New Brunswick and the St. Lawrence from Lake St. Peter to below Quebec can have persisted somewhere in those regions through the Wisconsin glaciation is distasteful to many who still hold to the archaic idea that

Wisconsin glaciation eliminated all life from these areas. So many evidences exist indicating that with us the Wisconsin was a relatively weak phase of Pleistocene activity as compared with earlier ice-accumulations, and so many conservative animals and plants are now found in regions where it is most improbable that they have arrived, without leaving traces of their migrations, since the Wisconsin, that I find myself not at all disturbed. My views and much of the evidence on this question and the phenomenal bulk of parallel evidence accumulated by Nordhagen, Hultén and others in Scandinavia and elsewhere in Eurasia and in Alaska are presumably well known. They need no expansion here. The evidence added by the isolated colonies of estuarine plants lingering in New York, New England, New Brunswick and Quebec is a slight but important addition to the whole story.

I have referred to *Ranunculus hederaceus* of wet sands of western Europe acting like a native on wet sands, tidal shores and about spring-heads in southeastern Newfoundland and on scattered points southward to Back Bay. It is simply one of many species which share western Europe and eastern America, especially Newfoundland. That considerable flora includes plants of mossy woodlands, acid bogs and other strictly natural habitats, plants which do not tolerate and can not spread by means of salt water. In addition to these plants numerous freshwater and land snails of native and undisturbed habitats show similar ranges. These and other cases, including some higher animals, are so numerous that it is absurd to imagine that they have been swimming the Atlantic in post-Wisconsin time, to find the natural habitats of Newfoundland, Gaspé and other areas within the latitude of Wisconsin glaciation. Their occurrence and their pre-Wisconsin spread has elsewhere been discussed and need not now divert us. *Ranunculus hederaceus* as well as *Carex arenaria* on the sands of Cape Charles may well be members of this illuminating group.

With this discussion of the disrupted floras of fresh tidal shores I close the paper. Their study is only begun. Thousands and thousands of miles of shores of fresh to merely brackish sounds and bays and hundreds and hundreds of fresh tidal river-estuaries from Florida to Delaware are botanically un-

known. They will yield many new endemics. As I have repeatedly said, there is plenty to do; there are few botanically equipped and with energy or initiative to do it.

Notes with Extensions of Range of several North American Orchids.—In the course of identifying American orchids, chiefly in the Herbarium of Oberlin College, there appeared the following collections of several species which constitute interesting extensions of range:

× Habenaria Andrewsii White ex Niles. (*H. psycodes* × *H. lacera* and *H. psycodes* var. *grandiflora* × *H. lacera.*)

This natural hybrid, which occurs from eastern Canada through New England and New York south to North Carolina, now appears in the middle West.

Ohio: Oberlin, South woods, June 27, 1890, *J. B. McCord s. n.* (Herb. Oberlin Coll. 71736).

Habenaria ciliaris (L.) R. Br.

This widespread species of the Atlantic coastal plain and the middle West is here recorded from Wisconsin. Albert M. Fuller (in Studies on the Flora of Wisconsin, Pt. 1: Orchidaceae Bull. Pub. Mus. City of Milwaukee 14 (1933) p. 46) says: "In 1838, Dr. I. A. Lapham listed it (H. ciliaris) for the Milwaukee region. . . . There has been no other record for this species in Wisconsin. The nearest station where authentic specimens of this species have been found, is Calumet, Cook County, Illinois."

Wisconsin: May 30, 1891, *R. M. Strong s. n.* (Herb. Oberlin Coll. 26232).

Habenaria clavellata (Michx.) Spreng.

Heretofore the northwestern limit of this widespread orchid appears to have been Minnesota. It now appears from the Rocky Mountain region.

Montana: Helena, *F. W. Anderson s. n.* (Herb. Oberlin Coll. 26444).

Epipactis latifolia (L.) All.

Until recently this common European species has apparently been restricted to the eastern part of Canada and the eastern United States. Lately it has appeared in the West.

MISSOURI: Jasper County, near Joplin, in moist rocky and clay ground at base of limestone bluff of Turkey Creek, July 5, 1928, *E. J. Palmer 34965.*

MONTANA: Helena, *F. W. Anderson s. n.* (Herb. Oberlin Coll. 26205).—CHARLES SCHWEINFURTH, Botanical Museum, Harvard University.

ABIES PROCERA, A NEW NAME FOR A. NOBILIS LINDL.

ALFRED REHDER

THE western Fir, known for more than a hundred years as *Abies nobilis,* and as yet not encumbered by many synonyms as most species of Abies are, must now change its name on account of an older homonym which so far seems to have escaped notice and is not listed in Index kewensis. This older homonym is *Abies nobilis* A. Dietrich, Flora der Gegend um Berlin (1823), a synonym of *Abies alba* Miller (1768), a species with an array of about fourteen synonyms, the best known of which are *A. pectinata* (Lam.) DC. (1805), not Gilibert (1792), and *A. Picea* (L.) Bluff & Fingerhut (1825), not Mill. (1768).

For the species in question it seems appropriate to select a name which has a similar meaning to that given by Lindley, and I have therefore chosen the following specific epithet, which may be considered a Latin equivalent of the established English name "Noble Fir."

Abies procera, nom. nov.

Pinus nobilis Douglas mss. ex D. Don in Lambert, Descr. Gen. Pinus, 8° ed., **2:** t. [81], 1 p. (1832); fol. ed. [ed. 1] **3:** 1 p., 1 tab. (1837).—Douglas in Comp. Bot. Mag. **2:** 147 (1836), nom.—Sabine ex Douglas, Jour. Travels 1825–27 [ed. W. Wilks] 342 (1914), cum descr.

Abies nobilis (Dougl. & Lamb.) Lindley in Penny Cycl. **1:** 30 (1833).

Picea nobilis (Dougl.) Loudon, Arb. Brit. **4:** 2342, fig. 2249, 2250 (1838); Encycl. Pl. Suppl. 1276 (1841).

Pseudotsuga nobilis (Lindl.) W. R. McNab in Proc. Roy. Irish Acad. ser. 2, **2:** 700, expl. t. 49 (1877) nom. provis. = *Pinus* (*Pseudotsuga*) *nobilis.*

The first valid publication of this fir appeared in 1832 under the name *Pinus nobilis* in vol. II of the octavo edition of Lambert's Description of the Genus Pinus; the unnumbered plate

following plate 80 is the same as that of Vol. III of the folio edition, except that the detached cone at the right and the branch above are omitted. The text accompanying the plate is exactly the same and Lindley's name does not appear as a synonym, not even in the volume of 1837. It may be interesting to note that figures of slightly enlarged leaves show on the upper and on the under surface rows of white stomata on the plate of the octavo edition, while in the folio edition the leaves are uniformly green. As stated in the preface of vol. II (1824) of the folio edition, the descriptions are by D. Don who therefore should be cited as the author of the new names published in vol. II and later. In Index kewensis, the name *Pinus nobilis* Dougl. is credited to Loudon, Encycl. Pl. Suppl. 1276 (1841) where it appears only as a synonym of *Picea nobilis.* In Comp. Bot. Mag. **2: 147** (1836) the name occurs without description or reference in a letter by Douglas. In a manuscript entitled "Some American Pines," and published as Appendix VIII in Douglas' Journal edited by W. Wilks under the direction of the Royal Horticultural Society, Douglas gives a description of this fir, the brief Latin diagnosis being credited to "Sabine in Trans. Hort. Soc. Vol." but apparently Sabine never published it. Lindley in Penny Cyclopedia (1833) cites "*Pinus nobilis* Dougl. and Lambert" as a synonym of his *Abies nobilis.*

The two following forms are occasionally met with in cultivation and the first probably occurs also spontaneously.

Abies procera, f. **glauca** (Ravenscr.), comb. nov.

Picea nobilis glauca [Hort. ex Ravenscroft], Pinet. Brit. **2:** 183 (1863).

Abies nobilis glauca Hort. ex Carrière, Traité Conif. ed. 2, 269 (1867).—Masters in Journ. Linn. Soc. Bot. **22:** 189, fig. 18 (1886), pro var.—Voss, Vilmor. Blumengärt. ed. 3, **1:** 1239 (1896), pro forma.—Ascherson & Graebner, Syn. Mitteleur. Fl. ed. 2, **1:** 294 (1913), pro lus.

Abies nobilis var. *argentea* Freudenberg, Bekannt. Cult. Nadelh. 5 (1886).—Hort. ex Beissner, Handb. Nadelholzk. 488 (1891).—(Beiss.) Voss, Vilmor. Blumengärt. ed. 3, 1: 1239 (1896), pro forma.—Ascherson & Graebner, Syn. Mitteleur. Fl. ed. 2, 1: 294 (1913), pro lus.

Abies nobilis glaucifolia Sudworth in Bull. U. S. Div. For. **14:** 58 (1897).

Pinus nobilis f. *glauca* (Beiss.) Voss in Putlitz & Meyer, Landlex. **4:** 774 (1913).

A form with glaucous or bluish white leaves.

Abies procera f. **prostrata** (Hornibr.), comb. nov.
Abies nobilis var. *prostrata* Hornibrook in Chittenden, Rep. Conif. Confer. **72** (1932).
Abies nobilis compacta Hort. Aldenham ex Chittenden, Rep. Conif. Confer. **423** (1932), nom.

A low spreading form about three times as wide as high. A glaucous variation of it is listed in Hillier's [Cat.] Trees Shrubs, **41** T: 185 (1934) or perhaps earlier, as *A. nobilis glauca prostrata.*

There is a form distinguished as *A. nobilis robustifolia* Sudw. [*A. nobilis robusta* Hort. ex Beissner, not Carr., *Pinus nobilis* f. *robusta* (Beiss.) Voss] described by Beissner as a vigorous form with longer and stronger leaves, which is unknown to me. The form described by Carrière as *A. nobilis robusta* has been referred as a synonym to *A. magnifica* Murray, and *A. nobilis* var. *robusta* Masters (in Gard. Chron. n. ser. **24**: 652, fig. 147. 1885) has been identified later by Masters himself (in Hand-list Conif. Kew, ed. 2, 103. 1902; in Gard. Chron. ser. 3, **41**: 114, figs. 51–53. 1907) with *A. magnifica* var. *xanthocarpa* Lemmon.

Arnold Arboretum, Harvard University.

Two Introduced Plants.—Just as it was beginning to get dark on October 6, 1939, I passed the pond by the Memorial Park in Abington, Massachusetts, and found it dotted with beautiful waxy white flowers more than a centimeter in diameter. Investigating, the plant below water looked like a glorified *Anacharis* or *Myriophyllum*, but the flower was like a *Sagittaria* blossom. I took specimens to the meeting of the New England Botanical Club that night, and Dr. M. L. Fernald identified the plant as *Anacharis densa* (Planch.) Vict., a Brazilian species. In Rhodora xxxiv, 151–152, this is reported by C. A. Weatherby as having been collected at Millneck, Long Island, in 1893 by W. C. Ferguson and in Amer. Fern. Journ. xxx. 103 (1940), R. T. Clausen mentions it as naturalized in the Peconic River, in the eastern part of the same island. Farther south Dr. Fernald reports it as locally very abundant in Virginia.

Mr. Ralph C. Bean visited the pond the following day and

found from one of the residents that the plant had flourished there for several years. It choked the pond so badly that in the late fall of 1939 the Park Department drained the pond to dry up and freeze the *Anacharis*. I revisited the pond Sept. 1, 1940, and found it nearly free of vegetation but after some search I found a few lusty strands of this interesting plant which had survived the ordeal. It is evidently more hardy than had been supposed.

Campanula glomerata L. is one of our older introduced plants which flourished along the Newburyport Turnpike in Topsfield and Danvers for more than a hundred years since it was reported by William Oakes. I found a hillside in Topsfield covered with this purple-flowered plant in 1917. In recent years this hillside has been plowed and pastured, and I could find no specimens there. I was therefore much pleased on July 1, 1940, to see several good specimens of this plant in bloom again in a marginal area which had escaped the plow.—Clarence Hinckley Knowlton, Hingham, Massachusetts.

Satureja glabella in Kentucky.—In a recent discussion of *Satureja glabella* (Michx.) Briquet, Svenson[1] states concerning the distribution of this plant, "apparently confined to limestone river bluffs and cedar glades in the vicinity of Nashville, Tennesee." Plants agreeing in all respects with Svenson's figure of *Satureja glabella* (as to height, leaf dimensions, calyx, corolla, non-stoloniferous habit) have been found by the writer near Defoe, Henry County, Kentucky, growing in open cedar woods on limestone ravine-slopes.—E. Lucy Braun, University of Cincinnati.

[1] Svenson, H. K. Plants of southern United States, II. *Satureja glabella* (Michx.) Briquet. Rhodora **42**: 6–8. Pl. 586. 1940.

Volume 42, no. 503, including pages 419–502 and plates 627–649, was issued 9 November, 1940.

ERRATA

Page 47, line 22; for *prealta* read *praealta*.
Page 51, line 12; for *Rugellii* read *Rugelii*.
Page 57, line 6; *for* CXXXI *read* CXXX.
Page 139, line 25; for *marina* read *marinum*.
Page 230, line 28; *for* pedicles *read* pedicels.
Page 245, line 17; *for* Turczaninoff *read* Turczaninow.
Page 257, line 34; *for* 99 *read* 95.
Page 259, line 3; *for* Rainer *read* Rainier.
Page 259, line 5; for *S* read var.
Page 265, line 3; *for* CHRISTOPHORINANA *read* CHRISTOPHORINA.
Page 267, line 32; for *canabina* read *cannabina*.
Page 270, line 25; for *hispidum* read *hispida*.
Page 270, line 29; for *glabratum* read *glabrata*.
Page 271, line 11; *for* Examplaren *read* Exemplaren.
Page 291, line 14; for *Anonymus* read *Anonymos*.
Page 291, line 15; for *aquatica* read *aquaticum*.
Page 371, line 36; *for* Horry *read* Myrtle.
Page 386, line 22; for *fluviatilis* read *fontinalis*.
Page 389, line 10; *for* 000 *read* 370.
Page 414, line 13; *insert in space* 357.
Page 471, line 28; *for* 1903 *read* 1803.

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